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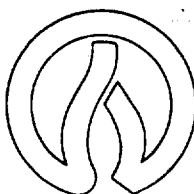
FINAL REPORT - VOLUME 3

George H. Quester

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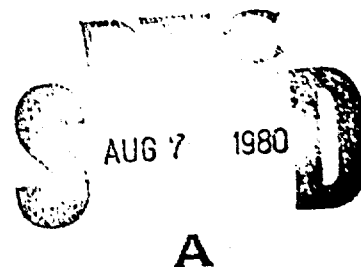
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**BY:  
George H. Quester**

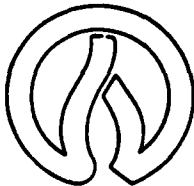
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<p>The United States may fail to exploit to the fullest its potential for economic recovery following a nuclear attack because of failures in post-attack management in both the political and the economic sectors. This report looks at possible adjustments in our continually evolving peacetime management systems, adjustments which might contribute substantially to post-attack recovery at little peacetime cost. The post-attack considerations addressed include making government more effective in bringing about</p>		

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economic recovery and, very importantly, making sure that government continues as government, i.e., that we do not sink into anarchy.

Five broad categories of adjustments are discussed. The first concerns keeping the market mechanism functioning, including a bolstering of the survivability of communications and banking systems, the preparation of alternative forms of money, and the creation of possible backup securities and commodities markets.

The second category concerns stabilizing title to property with reliable property records, the establishment of a well understood war-damage compensation system, and government backing of business credit.

The third category concerns reinforcing the existence of government itself, including decentralization of the executive branch, greater clarity of the succession to legislative office, a bolstered infrastructure for the judiciary, coordination of police agencies, the use of rationing schemes to reinforce political authority, and possible expansions of radio and television.

The fourth category concerns choices for increasing or decreasing the amount of government intervention in the economy, including rationing and price controls (as opposed to their alternatives), advance contingency contracts, and steps to encourage stockpiling and discourage hoarding, as well as policies on such traditionally regulated sectors as agriculture, foreign trade and public transportation.

Finally, the fifth category contains proposals more directly affecting the employment, safety and welfare of the people as a whole, including policy choices and some new possibilities for blast and fallout shelter, the supplying of information on the health and location of survivors, and the use of such information to achieve a fuller employment of the labor force.

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## PREFACE

This report has been written as part of Analytical Assessments Corporation's study of the management of the post-attack U.S. economy. Its purpose is to provide inputs to the thinking about what aspects of post-attack government control are essential for the formulation of a dynamic model of the post-attack effort to re-establish viability. Two other reports have been written covering other aspects of AAC's research on the management of the post-attack U.S. economy. They are:

A. Feinberg, "Civil Preparedness and Post-Attack U.S. Economic Recovery: A State-of-the-Art Assessment and Selected Annotated Bibliography," AAC-TR-9204/79, October 1979; and

G. Hill and P. Gardiner, "Managing the U.S. Economy in a Post-Attack Environment: A System Dynamics Model of Viability," AAC-TR-9205/79, November 1979.

Feinberg's report contains an assessment of the state-of-the-art of modeling and analysis for civil preparedness and management of the post-attack U.S. economy. This evaluation was derived considerably from a large volume of related literature. A selected, annotated bibliography of over 100 entries follows the state-of-the-art assessment.

Literature areas reviewed included historical disasters, industry studies, post-attack viability, survival and economic recovery, and civil defense, both U.S. and Soviet. Some literature on modeling methods was researched. Modeling methods covered were input/output, econometrics, optimization, and system dynamics.

Analysis of the literature and current state-of-the-art revealed several key management aspects of the post-attack economy. These aspects were resource allocation and distribution, energy, information, communication, command and control (C<sup>3</sup>), finance, social and behavioral response, and government authority. Most of these managerial aspects were found to have been neither thoroughly analyzed nor specifically modeled.

Assessing modeling needs, available modeling methods, and deficiencies in the state-of-the-art led to a recommendation for further development of system dynamics models for management of U.S. post-attack economic recovery. System dynamics is suggested because of its flexibility, potential scope, and capabilities for handling non-linearities, dynamic effects, and soft items such as social and behavioral responses.

The results of Feinberg's review led to the development of a system dynamics model of the management of the U.S. economy reported on in Hill and Gardiner's report. The primary focus of this study is to determine if post-attack viability (or collapse) is automatic for a given system, or if management actions can influence the outcome. In investigating this problem, the approach focuses on exploring the structure of a post-attack system for instabilities, identifying the processes that could lead to collapse, and then evaluating if and how alternative post-attack management policies can mitigate the effects of those instabilities.

At the conceptual level, the approach that was taken characterized a system's viability in terms of an inventories "race." Since the immediate post-attack period would be marked by a reliance on stockpiles and inventories to sustain the surviving population, the critical question was whether inventories would be depleted before the economy could replenish supplies by reorganizing initial production facilities. Additionally, the study attempted to determine how various types of systemic instabilities can affect this inventories race and how management actions can effectively overcome any debilitating effects that these instabilities might have on the ability of the nation to recover. These instabilities may appear due to the delays and uncertainties affecting such basic economic support systems as communication and transportation networks, organizational structures and resource allocation mechanisms.

A system dynamics model was constructed of a post-attack economy to study the management problems affecting these support systems in the immediate post-attack period. Through repeated simulations, the model was able to demonstrate the effects of potential instabilities on the performance

of the economy and how alternative management policies could mitigate those effects. While the results should be qualified as being preliminary in the sense that this effort is a first pass at the problem, there is sufficient evidence to proceed with a more extended analysis. The evidence suggests that the issue of viability is greatly dependent on effective emergency preparedness policies and resource management actions. The simulation results from the model clearly indicate that viability is not automatic even if adequate productive capacities survive; the same system can produce both viability and collapse depending on the choice of policies and management strategies. If ineffective pre-attack and post-attack policies are followed, the potential for debilitating instabilities arising greatly increases and so, too, does the potential for system collapse.

The present report is a companion piece to the above two studies. It starts with the conclusion of these two studies, as well as many other studies of post-attack recovery, that we are likely to fail to exploit to the fullest our potential for economic recovery following a nuclear attack because of failures in post-attack management in both the political and economic sectors. It also presumes that large-scale changes in peacetime arrangements will not win acceptance, so that the best hope for improvement is to look for more marginal adjustments in our continually evolving peacetime management systems, adjustments which might contribute substantially to post-attack recovery at little peacetime cost.

In addition, this report reviews general technological trends in key areas with regard to whether they will tend to make the government reorganization problems easier or harder. Inferences are drawn about relatively inexpensive pre-attack actions, based on exploiting favorable technological trends, which could be taken to make the post-attack management problems more tractable. The report is optimistic, in that it believes that a number of such adjustments deserves to be explored. The post-attack considerations addressed include making government more effective in bringing about economic recovery and, very importantly, making sure that government continues as government, i.e., that we do not sink into anarchy.



This analysis is intended to put upon the table a number of new ideas worthy of further consideration. It is not within the scope of this analysis to evaluate these ideas. Consequently, it may turn out that some of these ideas do not stand up to the scrutiny of further exploration. Nevertheless, we feel that this report serves the important purpose of providing a rich menu of management policies which should be evaluated further.

## EXECUTIVE SUMMARY

This report assumes that we may fail to exploit to the fullest our economic potential for recovery following a nuclear attack because of failures in post-attack management in both the political and the economic sectors. It also presumes that very large-scale changes in such arrangements will not win acceptance, so that the best hope for improvement is to look for more marginal adjustments in our continually evolving management systems, adjustments which might contribute substantially to post-attack recovery at little peacetime cost.

The report is optimistic, in that it believes that a number of such adjustments deserves to be explored. The post-attack considerations addressed include making government more effective in bringing about economic recovery and, very importantly, making sure that government continues as government, i.e., that we do not sink into anarchy.

Five broad categories of adjustment are discussed. The first concerns keeping the market mechanism functioning, including a bolstering of the survivability of communications and banking systems, the preparation of alternative forms of money, and the creation of possible backup securities and commodities markets.

The second category concerns stabilizing title to property with reliable property records, the establishment of a well understood war-damage compensation system, and government backing of business credit.

The third category concerns reinforcing the existence of government itself, including decentralization of the executive branch, greater clarity of the succession to legislative office, a bolstered infrastructure for the judiciary, coordination of police agencies, the use of rationing schemes to reinforce political authority, and possible expansions of radio and television.

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## I. INTRODUCTION

### 1.1 The State of Post-Attack Management

Current preparations for the management of economic recovery in the United States following a nuclear attack are clearly not at an optimal level. While it is possible to design elaborate modifications to existing political and economic systems attempting to remedy these defects, such extensive changes would likely be viewed as imposing unacceptable demands on the peacetime environment. The theme of the present analysis is that the U.S. may achieve greater success in preparing for the post-attack environment by looking for lower-cost changes, changes which might nonetheless greatly enhance the ability of the nation to deal with the problems of recovering from a Soviet nuclear attack.

Consideration of such options and possibilities appears particularly appropriate at the present time for several reasons. First, the national security community in the United States, and to an increasing extent the population as a whole, is taking a serious look at the possibility of a nuclear conflict with the Soviets and its various implications. The SALT-II debate has raised the national consciousness that the potential for such a conflict continues to exist, and suggests measures by which nuclear conflict may be deterred.

Second, in the aftermath of PRM-10, the Department of Defense and the military services have undertaken a comprehensive review of U.S. nuclear policy and its implications in a broad range of areas including the economic, political, social and military effects. This renewed interest in the effects of nuclear war now extends to the Congress, and is likely to extend to state and local governments as well in the near future.<sup>1</sup>

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<sup>1</sup>See, for example, Congress of the United States, Office of Technology Assessment, *The Effects of Nuclear War* (Washington: USGPO, 1979).

Third, in terms of its own preparedness for nuclear conflict and other national emergencies, the nation has undergone both a review of the set of problems it would face from nuclear attack and other major disruptions, as well as a reorganization of its federal institutions for dealing with such problems.<sup>2</sup> While such organizational changes do not, in themselves, provide the solutions to post-attack management problems, they reflect a new level of commitment on the part of the federal government to deal effectively with them.

Thus the possibilities presented in this analysis are ones that appear to be feasible within this new context, and are intended to have a relatively high ratio of post-attack returns to pre-attack costs. Further, these suggestions are ones which are estimated to have limited difficulty in winning widespread public acceptance in the pre-attack environment. They have not been arranged in any well-determined order of magnitude of benefits, magnitude of advance cost, or difficulty of implementation since such assessments are beyond the scope of the analysis. Yet they are, together, intended to comprise a package which would, at least, stand a significant chance of winning broad public acceptance even when public concerns about the risk of nuclear war are not high.<sup>3</sup> At the same time, they are ones which stand an equally substantial chance of making the relative difference between success and failure in economic recovery following a large-scale nuclear attack.

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<sup>2</sup>The federal civil defense function has been reorganized several times since the Federal Civil Defense Act of 1950. Most recently a Presidential proposal is being implemented which integrates the civil defense functions of the Defense Civil Preparedness Agency (DCPA); the emergency planning functions of the Federal Preparedness Agency (FPA); and the disaster responsibilities of the Federal Disaster Assistance Administration (FDAA) in a single Federal Emergency Management Agency (FEMA).

<sup>3</sup>Note that a number of existing programs and institutions were implemented when public concerns over the risk of nuclear war were considerably higher, such as the period following the first explosion of atomic bombs in 1949 and nuclear weapons in 1953, and the period following the Cuban Missile Crisis in 1961.

## 1.2 The "Dual-Purpose" Concept in Economic Management

What is proposed initially might be viewed as a substantial broadening of the "dual-purpose" concept which has been applied to civil defense decisions in the United States for much of the past decade. As this concept is currently implemented, some government plans and procedures which are useful for non-war contingencies such as severe storms, tornadoes, earthquakes and other natural disasters are funded as programs if such programs would also be appropriate to the post-nuclear attack situation.

This logic has a compelling appeal, and would be applied more broadly here, looking for overlaps not only between nuclear war and disaster relief, but also between enhanced preparedness for recovery from nuclear attack and more efficient management of ongoing economic and public affairs. Where a reconfiguration of the telecommunications and ADP systems associated with the national banking system might pay off for recovery from a nuclear attack, it might also provide some efficiencies in peacetime making it appropriate for the government to try to identify such dual-purpose applications in advance. Further, it is likely that some incentive may exist for the government to consider programs which defray some of the research and development costs associated with such changes, if not procurement and installation costs as well, and possibly provide tax incentives which would encourage such adjustments by the private sector in the absence of direct governmental support.

Some of the possibilities considered would, hopefully, produce net gains for the peacetime economy. Others might simply impose no cost, in the broad sense of the term, or only nominal cost on the peacetime economy.<sup>4</sup> A few of the situations considered below, such as the likelihood of persistent stagflation in the economy or the continued risk of accidents at nuclear power generation plants, are indeed highly undesirable by normal considerations. Still such situations may be unavoidable through

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<sup>4</sup>See, for example, the analysis of such programmatic costs in Mancur Olson, Jr., *The Logic of Collective Action: Public Goods and the Theory of Groups* (Cambridge: Harvard University Press, 1965).



the 1980's; the possible gains outlined for post-attack recovery would then amount to the "silver lining" of a cloud already burdening the nation.

### 1.3 Trends and Opportunities for Economic Recovery

The present report is generally optimistic that a number of such possibilities, mutually beneficial to the post-attack and non-attack environments, can be identified. This optimism stems from some general trends in the nature of our economic processes, the institutions which implement these processes, and the technologies which are now being utilized to support them. These are, in many cases, trends which may generate the opportunities we are seeking.

Among these trends, the following are of particular importance to the problems at hand:

- A set of new technologies is now offering a national telecommunications system (telephone, telex, and ADP links) with an order-of-magnitude greater capacity. This, by itself, will offer substantial redundancy and may offer options for making new systems less vulnerable as they are installed.
- The enormous expansion in the capacity of current generation computer systems, both in storage and processing, may make it far easier to store vital financial information such as bank account data, credit card accounting, property titles and similar information, thus eliminating much of the disarray and confusion which would otherwise tie up the economy following a nuclear attack. Some of these systems can be hardened physically; others will survive simply because their relatively low cost permits business and government to procure some redundancy and backup. The same ADP capability might be utilized by the government to provide a "real-time" assessment of the location of food, fuel, medicines, or other scarce commodities

following a Soviet nuclear attack on the United States.

- The basic monetary policy of the U.S. has in the past decade become less burdened with the role of serving as a world reserve currency. As a net result, it will be easier for the U.S. to adjust quickly to the monetary policies required entirely for the domestic recovery process, as the world reserve role would unlikely be filled by the dollar in the post-attack environment.
- The national trend toward more comprehensive government insurance for disasters and calamities might serve to develop greater public confidence that a post-attack situation would be governed by such insurance and burden-sharing as well.
- The proliferation of portable radios, televisions, and CB radios offers a means of continued national communications, public feedback and consensus-building after an attack.
- Simplified voter-registration procedures, and a general streamlining of governmental procedures may make it easier to reestablish political legitimacy and normalcy following a nuclear conflict.
- While chronic unemployment and underutilization of industry in peacetime is lamentable, these conditions are likely to persist for various reasons in a condition of "stagflation." The reserve capacity, in manpower and industry, thus left may paradoxically serve to expedite post-attack economic recovery.
- Completion of the interstate highway system offers a more survivable transportation system than either highways or railways previously offered.
- A possible shift to electric automobiles over the next two decades, at least in part because of environmental concerns and uncertainties of gasoline supply, would

provide a means of transportation that could more easily be fueled after a nuclear attack, since the electric power grid is inherently more survivable than oil refineries and pipelines. Centralized control over electric power distribution may also be easier for national authorities to achieve, supplying important leverage against any possibility of regional dissidence, even though it is difficult to control electrical distribution and use without shutting off some users.

- ADP systems mentioned above should make it easier for the government to collect, store and analyze data on aggregate population movements and even (for the benefit of family and friends) on individual location and condition. Such data may be submitted voluntarily, as forwarding addresses are now left with the Post Office, so as to reassure the public against a "police state" and nonetheless win wide acceptance, with such data becoming highly useful in the post-attack environment.
- The experience of urban riots, and the unconnected experience of dealing with terrorist attacks, might have given our police forces more than sufficient training for the elementary maintenance of law and order in a post-attack situation. These experiences have also led to significant coordination and interchanges of training among various levels of police forces.
- Some ecological and environmental concerns may help us to adjust to the possibility of a nuclear war, as such incidents as the Three Mile Island reactor incident sensitize the public to the need for evacuation planning, and as energy-cost considerations make underground construction of public and private buildings appear wiser in the future.
- While much of the world becomes increasingly dependent on North America for food supplies, the beneficial effect for

U.S. recovery potential is that the nation will be better equipped with food surpluses in the event of a nuclear conflict.

- Finally, it might be viewed as a favorable trend that the U.S. is becoming more of a nation of stockpilers and hoarders, no longer assuming the complete availability of all commodities at all times. Fears of shortages of gasoline and other commodities may be moving the U.S. toward the Russian consumer policy of "if you see a line, get in it." Should this become a long-term rather than a short-term phenomenon, with people maintaining larger stocks of essential commodities at home, it could paradoxically assist with recovery following a nuclear attack, both in logistic terms as well as in the psychological preparations for the post-attack adjustment.

The nuclear attack scenario considered in the analysis below is that of a Soviet attack specifically designed to impede the economic recovery of the United States, although many of the observations made below would also apply to more limited Soviet strikes, or strikes with an alternative orientation, such as Soviet attacks only at selected cities.<sup>5</sup> While the fundamental economic potential the United States would possess following such an attack is, by most accounts, adequate to achieve national survival and a substantial rate of recovery, it is possible that such a theoretical potential could not be realized because of imperfections in our political and economic management system. Each of the possibilities suggested in the present analysis is intended to assist in eliminating these imperfections.

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<sup>5</sup>This is, of course, a hypothetical Soviet attack intended to illustrate a "worst case" for U.S. economic recovery, and, in a sense inverts the NSDM-242 guidance for U.S. targeting policy. It is not intended to reflect any U.S. estimate of Soviet strategic (RISOP) targeting.

The specific suggestions of Parts II and III are thus most directly linked to re-establishing private economic enterprises in the recovery phase, by providing the equivalents of the communications and financial services they normally use, and by leaving them relatively free of anxieties about property title, debt, contracts and credit.

If government thus needs to be made more responsive to such economic processes, then perhaps it will even more urgently need to be reinforced as government, when many of its personnel have become war casualties, when its authority may be challenged on a regional basis, and when law and order may be in doubt for many areas. The suggestions of Part IV are directly addressed to this concern.

Assuming that viable markets can survive, and that government itself survives, Part V returns to the debate over how much and under what circumstances government should intervene in the market. Part VI then shifts to some suggestions for improvements in civil defense directly tied to the people, whose labor is a critical input to the recovery process and whose welfare is our ultimate concern.

## II. MAINTAINING THE MARKET MECHANISM

Economic recovery will happen more quickly if free market conditions can be restored; this is one dominant theme of our report. The proposals discussed in this section thus suggest various contributions to recovery that might be possible here through advance civil preparedness planning.

Markets by their very definition require that buyers and sellers be able to communicate with each other. As this is today heavily dependent on telecommunications, enhancing the survivability of the telephone system merits some extended discussion. Markets also depend on the existence of banking systems and a form of money, for otherwise we degenerate into barter. The market mechanism of our economy finally depends on organized commodities and securities markets; if these are likely to be destroyed in an enemy nuclear attack, it might be necessary to have some advance governmental planning on how to create substitutes for them.

### 2.1 Communications Systems

In this report we will continually be asking ourselves what makes a business enterprise function; what makes it order the moves that deliver a useful economic output for the nation? Studies done of the post-attack environment suggest that the necessary input resources and capabilities will indeed survive in sufficient quantity that such resources will thus be at the enterprises' disposal in a way which would make a satisfactory national recovery possible. Our lingering doubt has then fastened in particular on whether management will function effectively and on whether all the proper moves will indeed be effected.

A number of crucial ingredients are necessary to permit business management function. Transportation must be available to get goods moved between factory and user. The legal title for the goods being worked on must be assured, lest questions about it immobilize any use of the goods. There must be assurance of payment after the goods or services are delivered. Each of these is a requirement which will be addressed in our list.

Finally, but certainly not least on our list, the individual entrepreneur must have some way of coordinating with others, of being apprised of what a customer is asking for and of what other inputs are being arranged. Here is where the crucial significance of adequate communication is underscored, in making it clear from one segment of the economy to another what is being done and what needs to be done. Voice communication can even help solve some of the other problems just listed, re-establishing one's security about the title to property and about the assurance of being paid. Yet the simple coordination of industrial decisions may be the most important input of all.

An enormously significant input resource for economic recovery might thus show up in the national telecommunications system, including telephone, telex, netted ADP and credit systems. We arrange a tremendous amount of business by these means, confirming understandings with the partners we trust by the sound of our voices, clearing up misunderstandings, reconfirming arrangements where some fine-tuning is needed, etc. The United States clearly has the finest telecommunications system in the world, a system now rapidly adapting new technologies which have substantially expanded its capacities.

Younger Americans may not even remember the days when a long-distance telephone call was a luxury, when direct dialing of telephone calls was not possible, when the sound quality of the system was often strained. The ability of the system to absorb additional loads was not always very great. One of the earliest symptomatic consequences of the U.S. entry into World War II after Pearl Harbor was that long-distance telephone lines became overloaded, with long waits to get a call through. Even today, a snowstorm in a small town in upstate New York can overload the local telephone system's capacity, as everyone tries to call home at the same time to change dinner arrangements, etc.

It is proposed here that a great number of economic management problems will be solvable if those involved are only able to stay in voice communication with each other after an enemy attack. What has been said about the upgrading of credibility in business communications will of course hold

true for political communications as well. For example, if the President has survived the Soviet attack, having him spend a half hour on the phone with some key governor who knows him should be an important way of erasing rumors that he actually has been killed and replaced by an imposter, or that he is now the prisoner of a military junta which has seized control. Similarly, it should be an effective way of changing that governor's commitment, if he had previously been recalcitrant about committing the resources of his state to national needs.

Some direct consideration and attention thus might well be directed to hardening our telephone system against such attack, or to making it more redundant, or to routing circuits to bypass likely targets of Soviet attack. The outflow of new technology here should indeed allow for some hardening to occur at moderate cost by minor rechannelings of the changes which already will be under way in the system. Some of the toughening of the communications system would have to come by locating crucial junctions and switching centers in facilities deep underground, away from major cities, rather than leaving them in ordinary, vulnerable structures within metropolitan areas. But some of this will come naturally by itself, as expansions of capacity produce the kind of redundancy that lets one part of the system substitute for another automatically after an enemy attack. For economic purposes, it will be very important that an intact facility in Baton Rouge, for instance, somehow be able to discuss its problems and its opportunities with a similar plant in Boise, and a survivable telephone system would seem an elementary and necessary way to achieve this.

Some initial attention must thus be paid to shielding telephone lines (and telegraph lines as well, for which all of what has been said here applies equally) against the kinds of damage caused by electronic pulses induced by high-altitude nuclear explosions. The design of such automatic circuit-breakers or shields should not be beyond the ingenuity of American technology.

If communications satellites will play any central role here, consideration might be given to launching some additional such satellites into orbit, to be held in reserve and turned on only in the event of a war,



perhaps as a backup against any serious Soviet effort to destroy satellites along with American surface facilities in the nuclear attack. One might even go so far as to consider deploying additional telephone communications satellites in secure Minuteman silos, to be launched into orbit after having ridden out a Soviet attack (the opportunity cost of foregoing several more warheads directed at the U.S.S.R. perhaps being entirely worth it, in terms of comparative paces of economic recovery after a nuclear war has ended).

The achievement of such a hardening of our voice communications might at times be as much a political problem as an economic and material one, as it is sometimes easier to steer the flow of civilian technology naturally and unobtrusively into paths that are appropriate for survival after a Soviet attack, while at other times this becomes quite difficult. American administrators are not going to want to take steps which make the public at large feel that war is imminent or which make people feel that the possibility of future war is somehow being used to militarize our society and to put military priorities ahead of those of civil liberties and individual freedom.

It should be possible, however, to assure Americans that the provision of some governmental guidance (or even subsidies) for the hardening of crucial telephone facilities is not the first step toward having the government listen in on their telephone calls, or toward denying them the option of calling when they want to. Again, a most useful development here is simply the expanding flow of options and capacities which the telephone companies will be offering us over the next decade, making it clearly easier to give the U.S. government additional capacities without in any way curtailing or threatening the capacities available to the private citizen.

## 2.2 Alternative Banking Arrangements

Two most crucial functions for the operation of ordinary business might realistically be identified as courts and banks. Courts decide who owns property for cases of major litigation, and banks indicate who owns current liquid assets for ordinary transactions of business.

We have already had some experience with the breakdown of banks during the Great Depression, but it does not really give us any approximation of how this would develop in a nuclear war, of course, for it came without the destruction of major portions of industry or the killing of large numbers of people. The failure of the banking system was, nonetheless, a major obstacle to the functioning of the economy in 1933, and would be a major obstacle to the recovery of the economy after a nuclear attack.

An elementary solution was, and is, to bring in the credit and power of the federal government to guarantee deposits in bank accounts, thus restoring and maintaining confidence by depositors and by people thinking of making sales to depositors. If the banks were to "fail" after a nuclear attack, however, it would not be so much through irresponsible financial practices as through the sheer physical interdiction of their ability to maintain records and to move checks from city to city.

The appropriate approach to steering around this for the post-attack environment will thus consist in part of renewing and reinforcing the federal government's participation as the backup, ensuring that accounts will not be lost or defaulted, and by shifting to more survivable means of keeping accounts and transferring funds.

Again, some of the trends may be favorable. The widespread use of credit cards, of which Visa and MasterCard are the most important, in some ways resembles a shift to the European "Gyro" system. In advanced countries such as Sweden, one does not write a check to pay a bill, but rather gives the bill to a bank which then transfers a payment to the store or service involved. To the extent that such a system involves less movement of paper back and forth (the use of a credit card in the U.S. in effect amounts to referring a bill to one's bank), it leaves a system which has already looked more efficient for everyday business and which might be shielded with greater success against a wartime attack.

Serious thought might thus be given to the hardening of, and establishment of redundancy in, the central accounting data banks of the major credit card companies, to the similar hardening and establishment of backup redundancy in the long-line wire banks tied to such central data banks (this

being entirely tied to the hardening of telephone and telegraph communications links discussed and advocated earlier) and to the tying in of a fuller and more normalized federal government backup in the managing, insuring and reinforcing of the financial reliability of such credit card accounts.

The development of easier and more automated ways of paying money into such credit card accounts might close the circle. If many Americans are going to have to be paid by the U.S. government for the early recovery period, the fact that their accounts might be augmented (as well as guaranteed) by the government might give them a straightforward way of settling accounts and managing purchases on a better basis than crude barter. Again, any incremental improvements here achieved by some prearranged adjustments of the system might make substantial contributions to the speed and fullness of the economic recovery.

### 2.3 Alternative Forms of Money

Some of the starkest forms of chaos after a major nuclear attack might come in financial matters. The large fraction of monetary holdings in bank deposits might become inaccessible (as noted in Section 2.2 above) and would thus, for practical purposes, cease to exist for a time. The use of credit cards might also become largely impracticable, either because electronic access to such systems as MasterCharge and Visa would have been disrupted or because owners of commodities would no longer have confidence that they would ultimately be paid for charges run up on such cards. In addition, a certain fraction of paper money, of course, would have been destroyed in the nuclear attack, along with the people carrying it.

What then would become the role of the money supply that was left? Would it go up substantially in value simply because it had gone down so much in quantity (in a manner comparable to the decrease in money supply and consequent fall in prices of the Great Depression)? Or would the corresponding destruction and decrease in stores of valuable commodities more than match this, such that the sale price of such commodities was actually driven up, as potential purchasers desperately bid against each other in trying to hoard such items?

Many of the national disaster situations surveyed from the past (e.g., post-war Germany and Japan, the last year of the southern Confederacy) were characterized by a flight from money to goods.<sup>1</sup> But this happened because the money supply had been substantially inflated by wartime governments and because arbitrary price controls had held down prices such that few were willing to sell food or other goods at such prices unless they were compelled to do so. The nuclear war situation may be very different, however, in that large portions of the population may be required to move around, especially if some pre-attack evacuation schemes had been implemented. In the case of required movement, the individual instinct may be to hang on to money rather than commodities, since the latter are difficult to move.

Since the international role of the dollar has depended heavily on the industrial potential of the United States economy as a whole, there seems little doubt that such a role will be enormously diminished or eliminated in a nuclear exchange between the U.S. and the U.S.S.R., unless the nuclear warheads of the two arsenals were used to drag down the economies of the rest of the world as well. The central authority of the United States may thus have difficulty in persuading foreign countries to ship relief supplies to North American, even if some of our ports remained open and undestroyed, because it may not have enough credible assets to offer in exchange.

By official policy, or simply by the workings of the market, the value of the dollar as denominated in gold will thus fall drastically, and perhaps should be encouraged to fall. Even within the United States one would find a fair number of sellers who would not accept any form of U.S. paper money but would be ready to accept gold. Foreign paper money would be accepted here and there, based on news reports of who had escaped nuclear destruction and on historical memories of who had managed its currency responsibly in the past. But this will create a very small addition to the total of liquid

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<sup>1</sup>See N. J. Hirshleifer, *Disaster and Recovery: A Historical Survey*, RM-3079 (Santa Monica, CA: RAND Corporation, April 1963).

assets; Swiss francs are not generally available around the United States. If Canada were not too badly hit (perhaps a very unlikely scenario, in light of all of our assumptions about the Soviet nuclear attack), Canadian money might win a wide acceptance in a zone along the border as, indeed, it apparently did during the Great Depression.

Two seemingly very opposite situations, (a) where confidence in national currency has been totally destroyed or (b) where the supply of such currency has conversely been substantially diminished, could produce basically the same unwanted result: a wasteful barter system. In such situations, we might sometimes see local authorities, or local sources of wealth (a well-trusted bank or the richest man in town), facilitating commerce by issuing their own alternative form of money. If it were printed on sufficiently strong paper, even the personal check of someone named Rockefeller or Hunt might be circulatable, winning continuing acceptance as long as it were evident that the properties and holdings of the person in question had not been destroyed in the nuclear attack. This, to close the circle with what will be suggested later, might be particularly true of vouchers for supplies of food or medicine or fuel, where the vouchers were issued by a private company reliably known to be in possession of such supplies. Yet the difficulty with such forms of scrip is that their acceptance is too local; they can replace barter for in-town sales, but the economy remains tied to barter for longer distance transactions.

One solution for U.S. central authorities, if there are such authorities still in existence, might thus simply be to announce a very basic return to gold, ignoring all the normal worries about what this would mean for international trade (since such trade will have been substantially disrupted anyway). The news would be transmitted that the United States government now values gold at something like \$500 per ounce, and will buy and sell gold freely, thus perhaps leading the average American to conclude that U.S. paper money has some reliable, enduring value again. Many persons would otherwise have been reluctant to accept Federal Reserve Notes for fear that these would soon be without value, but would have accepted gold because through history this has always retained some value, even in

the worst of political crises and economic upheavals. If the link between the two were made credible again, and the government did not thereafter inflate prices by printing up money irresponsibly, the role of paper notes might be salvaged.

A very different approach might come where the central government, or a local government, had seized control over essential commodities -- good and gasoline normally seeming the most salient examples -- and issued ration coupons or vouchers entitling the bearer to specified amounts of these essentials. Soldiers and government workers and recovery laborers could be paid in these vouchers, and the vouchers would be treated as transferrable, such that they could become the medium of exchange for other transactions. The reliability of the local or wider authority issuing them, in actually coming up with the food or fuel, would be what makes them acceptable.

The latter approach, of course, requires at least two kinds of advance preparations to make for effective post-attack recovery. The governmental authority must be able to lay hands on the food, and the voucher coupons must be printed and circulated. Since the stockpiling of food may be a wise measure in its own right, or at least the maintenance of survivable governmental records of the location of food, this may not be such a difficult move to make. The desirable form of food coupons will be somewhat more difficult to predetermine. Our normal preference might be for a national "currency" on this as part of keeping our national economy integrated in the recovery phase. Yet the sheer unpredictability of the form of Soviet attacks will leave it unclear whether some corners of the country may not be hit much worse than others, thus distributing the shortages of food or fuel quite unevenly, suggesting that rationing schemes should be instituted which vary from one region to another, and thus separating into new state and local currencies.<sup>2</sup>

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<sup>2</sup>As the chaos sorted itself out, of course, one might have a number of such currencies in circulation at the same time, with varying exchange rates among them. Trade in a Michigan town might be conducted with a mixture of gold, diamond rings, Federal Reserve Notes, Canadian dollars, and food vouchers. Virtually any of such monetary tools would improve the economy's performance over a straightforward barter, where shoes were traded for potatoes, etc.

As noted, the economy might experience a substantial *deflation* if the decrease in the supply of money exceeded the decrease in the supply of goods, and/or if individuals anticipated having to move in the future and thus sought liquid assets to take with them. Conversely, one might see a great *inflation* if the reliability of the central government backing any paper money came into question, and if food and fuel and medicine threatened to go into short supply. Indeed, one would undoubtedly see a mixture of price increases and price falls, as real estate values might drop while food costs went up, as automobiles became a drag on the market while gasoline and spare parts became very expensive, etc.

As will be discussed below, inflation might be desirable for at least one particular concern; namely, to achieve a sort of *de facto* moratorium on debts and thus to allow business to proceed in accordance with its normal rules. One can only use a state-imposed *official* moratorium on debts for a short while, beyond which it brings all negotiation of business transactions to a standstill. By contrast, if we allowed a one-time tenfold increase in prices to make most debts meaningless, business might still flow ahead, with new debts and new contracts. Much would depend on whether business associated the one-time inflation here with the one-time event of a nuclear war.

What would be clearly desirable on the monetary side, therefore, is some central monitoring capacity of what was happening to prices around the country, so that monetary authorities might generally be preprogrammed to run their printing presses, or to stop running them, as the supply and demand for money indicated appropriate. The government then would be expanding or contracting the money supply by the relatively primitive approach of printing or burning the vouchers and notes, rather than relying on the more sophisticated and indirect means of using reserve requirements and interest rates in the banking system, because much of the banking system may, for a time, be inoperative.

Several suggestions thus emerge from this which may be worth undertaking, even when the political costs of advance preparations are taken into account.

Given that there may be a desperate need for decentralization of government economic policy if Washington has borne a heavy portion of an enemy's attack, some attention has already been directed to having the management of money and banking taken over by the separate Federal Reserve Districts and even by local banks working to coordinate with each other. Further research is probably in order on a number of points here. To begin, the Federal Reserve Districts are themselves based in large cities, and the advantages of targeting them, along with Washington, can hardly have been lost on the Soviets. The extent to which the central data collection and decision-making responsibilities of such districts should be dispersed or relocated or hardened against attack is something well worth considering.

A somewhat different point arises; as noted above, on the elementary economics of how such districts or banking units would interact if the central coordination mechanism of the United States has been removed. Ideally, we would still be tied together as a nation by a single currency. Assuming that our governmental authorities could still maintain some sense of value for their paper money, how would all of this function if one area has been devastated more than another, if one area is characterized by inflation of dollar prices while another suffers a deflation, if heavy recourse has to be taken to reliance on paper money in some states while checks and credit cards continue to displace this in others? Would we see Americans studying their Federal Reserve Notes to see whether they are imprinted "B" or "C," discounting some districts against others? Would there be some sort of arbitrage or movements of the market economy which would take care of all of this, evening out prices by movements of goods to areas of highest need? Would the government or governments which appear after an attack actually find it necessary or desirable to fractionate the country into different monetary units because different degrees of devastation or reliance on paper money required this?

What if Federal Reserve Notes were thus generally valued and accepted in Oregon (which, perhaps, did not get hit very hard by the Soviet attack) but were found of dubious value in North Carolina, amid a consequently



enormous inflation of prices in dollars paid per can of beans?<sup>3</sup> Will the economy be brought into proper functioning more easily by trying to maintain one currency for the entire country, or by issuing separate notes for one region or the other? The advantage of leaving the currency the same for the entire country would, of course, be that it would by natural market forces pull commodities to where they seemed to be needed the most, to where the price for them had been bid the highest.

Whatever central authority or regional authority (e.g., the separate Federal Reserve Districts) or state authority survives a nuclear attack will be able to get the economy rolling faster if it is more able to monitor what is happening on the monetary front, and if it has made some advance preparations. The advance printing of food vouchers and fuel vouchers (more in the physical shape of durable paper money than in the form of fragile food coupons) is not out of the question. Similarly, so is the advance printing of gold notes, clearly denominated as being convertible to gold (and, if the price of gold has been set high enough, even exchangeable with existing Federal Reserve Notes) to be put into circulation if a nuclear attack has led us to go back to the gold standard. The installation, and hardening against attack, of more reliable communications links and of extensive data banks has been recommended elsewhere in this report, but clearly would help monetary authorities decide when deflationary or inflationary moves would be appropriate, and where. The contingency preparation of several alternative currencies should even be contemplated, for the possibility that different parts of the country will want to be segregated in terms of currencies in use.

One could similarly consider relocating the nation's gold reserves, from relatively vulnerable Fort Knox to dispersed and hardened locations

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<sup>3</sup>We lack most of the historical experience that would be of any help to us here. Yet a study of the early and middle nineteenth century experience of the United States, when many different kinds of "money" circulated, issued by state and other banks, might be of some help in projecting the kinds of negative or positive incongruities we have to look forward to.

around the country, on the frank expectation that such gold would have to be made available for sale after a nuclear war and would not be as needed for decades thereafter for its current purpose as a reserve and reference point for international trade. The crucial point, of course, is not that many Americans would want to come rushing through the residual radioactive fallout to pay \$500 per ounce for gold, but rather that the mere reassurance of being free to do so, reinforced by the occasional someone who actually opted to carry the metal rather than the paper bills, would make everyone have more confidence in the bills.

The central data management could, over time, be expanded to give governmental authorities a continuous readout on the location of food and fuel and other commodities, as suggested elsewhere. The crucial role of the government here is, of course, to maintain public acceptance of paper money, and other forms of monetary conveyance, as a means of reducing hoarding and barter, and thus of expediting a return to full efficiency in the recovery process.

Any return to a barter economy, for lack of a central monetary instrument, must be seen as a failure to do our best in recovering from a nuclear attack. Anything that conversely looks and works like "money," whether it be old Federal Reserve Notes or special "emergency money" (pulled out of contingency vaults, having been prepared for just such a nuclear emergency), or a return to gold as the basic form of money, or a desolution into separate state or regional or Federal Reserve District currencies would be a much better solution than a reversion to barter.

The question before us is thus whether enough energy and money has been spent on hardening and preparing the recovery monetary and banking system. The related question, as always, is whether there are not some opportunities we might snatch up simply as our money and banking system continues to be modernized and automated, opportunities involving slight changes in the new systems being installed which would make them more likely to survive a nuclear attack.

The period after a nuclear attack will probably see many Americans withdrawing their bank deposits to convert their assets into liquid cash.

One would, as noted, have considerable difficulty in managing transactions by personal check or by credit cards or other means of deferred payment. In the immediate aftermath of an attack, the federal government may thus wish to apply some upper limit on the amount of cash that can be withdrawn from individual bank accounts, to prevent the preemptive panics where everyone fears that his neighbors' selfish caution will deplete the bank, and thus rushes to do so himself.

After a time, however, the banks would have to be allowed to give depositors more unrestricted access to their accounts, even if this required that the government provide additional supplies of cash to redress the balance.

To keep banks from going out of business and to allow for something near the ideal velocity of commercial transactions, the federal government should consider having preprinted substantial volumes of paper money, to be prepositioned at various locations around the country. In effect, the reliance on cash of the American economy would be reverting to what it was in the past, before the widespread use of checks and credit cards came to replace it, and the government's issuance of additional paper money would simply be designed to allow the economy to avoid a major deflation.<sup>4</sup>

One supposes that it would be appropriate for the government to suspend most, or all, tax collections for a period after a nuclear war. The processing of tax collection would be a needless additional burden in an atmosphere where the government has more work to do than it may be able to manage. If the government needed funds to pay its bills in this emergency situation, it should be allowed to print the money.

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<sup>4</sup>Obvious security problems would arise as individuals felt a need to carry large amounts of cash about with them rather than paying by non-negotiable checks and credit cards. A greater degree of police protection might thus be entailed by this change in the form of assets, but such protection would have been required in any event by the other chaos and turmoil following the attack, such that some reasonable adjustment to the security demands of the financial side might still be possible.

After a time, if the monetary situation seemed to be becoming inflationary rather than deflationary, some degree of tax collection might be resumed, for the moment, perhaps, with a view toward concentrating on those taxes which were easiest to administer and collect, or those which would do most to redress any popular grievances about unjust distributions of burdens and benefits in the wake of the war.

A certain amount of taxation will, of course, ultimately be necessary just as part of achieving the sense of "normalcy" we have been advocating so strongly throughout this report, as the average citizen will take government more seriously when it shows signs of imposing ordinary duties as well as delivering ordinary services.

#### 2.4 Backup Central Marketing Arrangements

The efficient functioning of the United States economy depends not only on the network of communications links, but also on the particular nexus of a central market where prices can be compared and brought into line with each other, the two major types here being the commodities market and the securities market.

While the economy can function passably for a time when such central coordinating mechanisms are not functioning, as on holidays, in snowstorms, at the outbreak of World War I, etc., such mechanisms become more necessary over the longer run if the level of business is not to fall well below the optimum.

The major exchanges will surely be put out of action by a large-scale nuclear attack. They would survive if only Washington were hit, or only a few U.S. cities. If they were destroyed, the question then emerges as to whether the government should attempt to guide an economy afterward without such central marketplaces, or should it instead attempt to recreate them at some early stage and perhaps even stockpile the equipment and expertise that would be needed to put one into operation. At the extreme, one could design an underground bunker in Colorado amounting to a duplicate of the exchange facilities of Wall Street and Chicago. This might be wildly impracticable for an immediate swing into operation (such immediate operation

would not even be desirable, since one would have to get out of the initial post-attack chaos to make such commodities and securities markets meaningful), but it stands to reason that various increments of advance preparation might produce substantial rewards in terms of timely reconstitution of these market processes after an attack.

### III. STABILIZING PROPERTY TITLE

As discussed in the proposals of this section, economic recovery will proceed more rapidly if individuals are not immobilized by uncertainties and feelings of injustice about title to their own property, or about the sharing of damages caused by war, or about the credit reliability of people and firms with which they now may choose to do business.

#### 3.1 Reliable Property Records

Aside from bank accounts, the atmosphere of a nuclear war will pose a threat to property titles in general. Substantial numbers of people will have been moved around, court houses and other depositories of records will have been destroyed, or sheriffs will be too busy with other tasks to referee property disputes. Homeowners -- and property owners in general -- may then be distracted by fears that some "squatter" will after a time assert a claim to what is not rightfully his; any effort at economic recovery will seem less worth undertaking if it seems that the fruits of one's labor will not be protected against arbitrary seizure.

Much of this fear would be diminished if one had some general assurance that a bona fide record of title at war's outbreak was indeed safely below ground in some vault, to be used to sort out the rights and wrongs of property before the end of the recovery process, even if others matters kept society and its law makers from turning to it before then.

Adjustments would be made, of course, to equalize the damage incurred in the attack (a system discussed elsewhere), but this is something most Americans would find reasonable and not overly distracting. What would be far more distracting and upsetting for the economic recovery process would be a feeling that "might makes right" on title to homes and vacation homes, automobiles and small stores, and that "possession would be nine-tenths of the law" or greater in such matters. Such feelings might tempt Americans to resist movement to areas where they could be more profitably employed, for fear that they would lose too much as a result; it might destroy, in a sense

of "what's the use of it all?" the personal incentives that have typically made our economy move so well.<sup>1</sup>

Titles to property could be kept in federal vaults or state vaults, the important factor being that they be secure and underground, possibly redundant to insure survival through duplication. The possibilities of electronic data storage now, of course, make such a large volume insurance of title much more feasible. It is not that every single property owner in the United States would need to turn to such data banks to confirm his holdings; rather, the mere knowledge that he *could* turn to such records in the event of a doubt or a dispute would free his mind and energies for other matters, thus reducing the tensions and possibly brutal conflicts that might otherwise consume the time of sheriffs, workers and managers needed elsewhere.

### 3.2 War-Damage Burden Sharing

Many Americans have shown themselves to be reluctant to contemplate the shape of the world after a nuclear war. Less has thus been done than could have been done to publicize and establish government-managed insurance and war-damage burden-sharing arrangements, and there is probably still a limit to how much we can do here in the future.

Yet it is also clear that we will have greater economic efficiency in the recovery period if the typical American entrepreneur and citizen feels that there is some reliable justice to the entire system so that he will not have lost more than his share just by the luck of the draw in the shape of the enemy's attack.

The background trend of what we are doing for non-wartime situations is, as always, a relevant factor to be taken into account here. Slowly

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<sup>1</sup>To draw a farfetched analogy, this is all somewhat like the difficulty of motivating students to study when a rumor emerges that the instructor's record of all their grades to date in a course were lost. What we may find very useful is the equivalent of a xerox copy of the instructor's grade list, generally known to exist, so that the students need not lose their sense of there being a record.

but steadily, we are moving toward greater mutuality of insurance, and greater government participation in such insurance, throughout our society. The slowness is necessary because too much insurance and social underwriting of risks in ordinary society can undermine incentives and subsidize carelessness, and can thus drive up total costs in medical care rendered, etc. Yet we see a new concern for government compensation for victims of crime and a growing sense that individuals overwhelmed by disastrously large medical bills should not be driven into bankruptcy. We also have regularly had the impact of weather disaster defrayed somewhat by the community as a whole, in part even through the civil defense mechanisms intended for a wartime situation.

It should thus not be impossible to get the American business community and public more and more accustomed to the idea that we are already committed in advance to a sharing of burdens in the aftermath of any nuclear war.

As noted for some other aspects of publicizing civil defense preparations, it will be important that the promulgation of such advance commitments not somehow be seen as a warning that the risk of nuclear war has gone up, or else an average American might again shut this out of his consciousness, in a general aversion to contemplating what is unpleasant.

This in no way suggests that Americans would be opposed to plans for the sharing of the burdens of any possible war-damage, any more than they would be opposed to other civil defense preparations which could be arranged at not too exorbitant a cost. Rather, we are dealing with a psychological phenomenon not so closely tied to the policy preferences of voters, but rather to their wish to limit having to contemplate various kinds of unpleasant realities. When considering hospital care, most Americans, including those who favor supporting such facilities, will not like to think about the messy details of the operating table. While favoring highway safety, they similarly will not like to contemplate the gory details of a typical auto accident. And, while favoring preparations for personal and national survival in the event of a nuclear war, they will not like to think about the details of such a war or the details of such preparations.



To help American citizens to decide such choices in accordance with their own preferences (we are in no way advocating overriding their preferences or interests here), we may nonetheless have to use a slow and gentle and indirect approach to get them to consider the broad alternatives, despite their aversion to thinking about the unthinkable. The possibility will otherwise arise that we would be frustrated by their sheer aversion to contemplation of unpleasant possibility frustrated in two ways: our insurance plans would never be completely finalized and the public's awareness of their existence, the crucial output for the expediting of economic recovery, would never get established.

For purposes of maximizing American economic recovery, we would thus want the average American businessman, sitting in his fallout shelter, to be already intuitively assured that major disaster injustice would not be one of his problems so that he can get this thoughts back to business, just as the average American with Blue Cross coverage does not typically worry a great deal about the financial implications of his child's illness, but rather concentrates on the practical tasks of achieving a cure.

### 3.3 Credit and Debt Policy

The typical industrialist in the post-attack environment will ask six types of questions, four of them related to the future and two to the past. The four related to the future are:

- Who will buy my product?
- How will he be able to pay me?
- Who will sell me the inputs I need?
- How will I be able to pay him?

The two related to the past (i.e., to the period before the nuclear war broke out) are:

- How will I pay debts I incurred in the past?
- How can I collect on debts owed me from the past?

An important part of government economic policy for recovery after a nuclear war would come in getting the first four types of questions

answered in a way which spurs the maximum production of what we need; this may then require unencumbering and disconnecting these four questions from the final two.

An elementary and simplistic distinction might thus be advanced as follows: After a nuclear war, we would want firms to feel relatively unbothered about obligations and debts which they had incurred before the war, and relatively unconcerned also about debts others owed them from before the war. At the same time, we would want high respect to be shown for all new debts incurred, with high prospect of payment. The general confidence one had in the faith and credit assigned new obligations would be essential to a resumption of a high level of business activity. By contrast, the pattern of "old debt," incurred under assumptions plausible before the nuclear war broke out, would be a heavy burden on the economy.

One could thus try a temporary moratorium on all debt, as with Roosevelt's "bank holiday" of 1933. Yet any general moratorium on debt payment has been likened to a tourniquet, a device which can be applied to maintain life for a short time, but which over the longer run must be removed and replaced if life is to be preserved. The aftermath of a nuclear attack, with its extreme disruption of financial processes, would have the impact of placing many individual firms under the threat of bankruptcy; the task of the government and financial authorities would be to prevent such temporary and "unreal" bankruptcies from occurring but at the same time allow normal bankruptcies and business failures, the kinds that are useful for cleaning the entrepreneurial misfits out of the system.

We could also simply write off the "old" debt once and for all by declaring it null and void. A difficulty with this approach is that some businesses would be dependent on the income from old debt to maintain their activities in the new post-war period. Another difficulty is that projections from the way old debts are handled could affect the confidence people have in new debts. A third difficulty, which hopefully could be addressed by the process of recovery insurance adjustments, arises simply in our sense of "fairness," as damages which are suffered unevenly should be spread out across the community as a whole. Creditors who would lose a

great deal by the suspensions of old debts or by the process of inflation would have to be compensated somewhat for their losses and should be meaningfully reassured in advance that such compensation is forthcoming.

Rather than a blanket moratorium on all debt payments or a blanket cancellation of all past debts, we obviously will need some more finely-tuned approaches.

As a more familiar policy alternative, a deliberate or inadvertent policy of inflation would of course have the impact of tending to wipe out the value and significance of old debt while still leaving new debts incurred and negotiated at the new higher prices meaningful. For this to work, for real trust to emerge in the post-attack economic atmosphere, the inflation must of course show signs of being under control and of being likely to level off, or at least to fall to more normal pre-war levels.

As yet another alternative, one can have the government accept the obligation to pay old debts, also assuming the later collection from those who were debtors. The state clearly would have to play some major role in moving funds about in any event. As noted above, a well designed program of compensation for war-damage, if organized and publicized properly, would be very useful as a soothing agent for business activity, even when none of the payments was made until long into the recovery process. A few of such adjustments would have to be made earlier, however, not simply to address people's sense of fairness and justice, but to allow firms to operate when their normal source of revenue has been cut off by the form of the enemy attack. Such "payments on the basis of need" might be advances against "payments on the basis of justice," but the two might not necessarily be the same, with the positive or negative differences being left to be sorted out later.

Even where a firm has undergone no damage in an enemy attack (when it would indeed later have to pay additional taxes as its fair share of the loss experienced by other firms), it may become entirely appropriate in the early recovery phase for the firm to be helped to expand its operations if its output were critical to the rest of the economy. Where no other source of funding for such a nationally valuable capitalization can be found,

government funding would again be appropriate, even where no question of an "advance" on later compensation is then involved.

Assuming that the product in question was of the highest priority, one would still hope that the price for it would be set reasonably so as to ration demand and generate a profit; this would allow the firm to pay the government back with interest on the loan involved, and would condition suppliers and demanders to be ready for an early return to full market processes. If, by some slip of government intervention, this price were not set properly, we would face prospects either of windfall profits or of operations at a loss for the company involved, each of which could still somehow be compensated for, each of which would still be preferable to unnecessary delay.<sup>2</sup>

The impact of such government intervention would no doubt cause some abuses and scandals and windfall profits, and over the longer run might contribute to a substantial inflation and to corruption. Yet, if the central authority of the government has not totally broken down, if the value of U.S. currency has not fallen completely into question, the gains of such a short-term policy would clearly outweigh the long-term costs. At some time well into the recovery process, the government could perhaps undo the visible impact of such inflation by issuing a new currency at something like a ratio of one dollar equal to 1,000 of the old. In the meantime, the maintenance of industrial activity would take precedence over the avoidance of monetary inflation.

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<sup>2</sup>It might thus be altogether desirable for the government, at least temporarily, to assume the credit-rating function currently performed by a firm such as Dun & Bradstreet, collecting and integrating data on the actual financial health of the companies involved and on the essentiality of their continued operations for the interim, backing up such credit ratings with the guarantee of total or partial assumption of corporate debt. The U.S. government bailout of Lockheed Aircraft in effect provides the model here, but government financing of loans and outright payments may have to be much more substantial, given all the unusual financial shortages and losses which will arise in the post-attack environment.

A great number of Americans are paid today by fully automated payroll computer arrangements, checks being printed and mailed each week or month, arrangements typically centered in cities very likely to be targeted in a Soviet attack. When such Americans would in every other respect be able to continue to work at some undamaged facility, one would not want to leave them unwilling or unable to work simply because their normal access to pay had been disrupted.

Clearly, a practicable approach would be to develop contingency arrangements whereby their check stub for the last pre-attack period would be treated by local banks or local federal agencies as a continued periodic claim for funds. Whatever the possibilities of fraud in such a case, the credit system backing the recovery program could take the chance of disbursing cash (perhaps in printed money as suggested elsewhere) against the signatures of the employees involved, in effect an advance covered by what we have every evidence was their real pay.<sup>3</sup>

For the duration of the recovery period, it would similarly be necessary, in all probability, for the federal government to assume some obligation for backup coverage of the debts of state and local governments, given the likely impossibility of their collecting taxes. Only the federal government can generate money by printing it, an option denied to the states. In a real sense, we make the federal government collect taxes to avoid inflation, rather than to pay its bills, for it could normally simply print money to pay its bills. Whether such an insurance of state debt would have to be made permanent or not is something we might worry about in the longer run. For the immediate period, however, the maintenance of the social and police functions of state governments would obviously have priority.

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<sup>3</sup>A superior alternative, of course, would be for the federal government to encourage the relocation of such critical computer facilities away from central cities, there seemingly being no real reason why they would not work just as effectively from small towns in Ohio or New England, or from the inside of shelters dug into mountainsides. Dispersal and hardening, and even duplication of facilities by the installation of backups, are going to be easier as the capacity of automated computer handling continues to rise, and as the cost continues to drop.

#### IV. MAINTAINING THE INSTITUTIONS OF GOVERNMENT

Nothing is likely to be accomplished in economic recovery unless some political authority is maintained in the United States after an attack. An important theme of this report is thus that the political input to economic recovery may be one of the most crucial.

The proposals of this section address small steps which might enhance the survivability of the executive, legislative and judicial branches, as well as ways of utilizing police coordination, improved communications, and economic processes to this necessary reinforcement of the government.

##### 4.1 Alternative Executive Arrangements

Because we need a single-man highest authority in the executive branch, unlike the legislature and judiciary, and also because of the demonstrated risk of assassination, we have over the years taken more seriously the problem of succession, specifying a fairly long trail of duly-constituted officers who would succeed to the Presidency if the others had died. Unfortunately, for a nuclear war situation with little warning, all such officials would normally be in Washington, which raises a considerable risk that no obvious successor would have a legitimate claim to the post after a Soviet attack on the city.

The maintenance of such legitimacy is, of course, only a part of the problem as we also will need a genuine competence at the center to coordinate national affairs including, not unimportantly, the continuation of the war if it has not ended and also the processes of economic recovery which we are discussing. Some of the studies of the political aftermath of a nuclear war have thus reluctantly quite totally resigned themselves to the loss of this central coordinating activity at the federal level, as the major executive task would then fall to such state governors as survived or, perhaps, even to local government.

Yet the major difficulty with most of state and local governments is that they lack experience with making major choices relevant to economic

processes, and certainly have not been trained to take a macroscopic focus on such processes. Perhaps the requisite kinds of managerial experience could be found in a few multi-state agencies, such as the Port of New York Authority or in the governance of the larger states; but many of the state and local governments would not be plausible as training grounds or substitutes for the Presidency.

At the level of executive political administration, this amounts then to concluding that the United States is burdened by some of the same excessive centralization that we impute to the U.S.S.R., perhaps because the natural condition of our peacetime problems drives them to a federal solution, or perhaps because the power appetite and taxing powers of the federal government pull problems in this direction, even when it is not optimal or appropriate for their solutions.

The trends here may not favor our having a greater recovery capability as we go into the 1990s. Ideally, we would like six or ten or fifteen governors or interstate authority managers to have proved themselves to be presidential timber, and to have developed the skills and working style and overview that could let them take charge of massive economic recovery problems if Washington had suddenly been destroyed. This is analogous to the improvement of survivability by multiple aimpoints and redundancy that we advocate for other possible targets of Soviet attack. Yet the nature of our system is not to encourage such redundancy and pluralism in the normal processes of peacetime government.

The proposal for metropolitan government is often advanced as the solution to the problems of our urban areas, and we might yet see a few breakthroughs in this area, producing executive agencies with some of the scope we desire. Yet, if a great number of American metropolitan areas were to follow the example of Toronto, this would again come in precisely the areas which Soviet missiles are most likely to target for other reasons. If New England were to be pulled out of a disaster without the help of an eliminated federal government, the coordination and overview probably can not come from Boston, which might have been hit just as hard as Washington.

Civil defense agencies will, of course, be trained to supply some of this overview, being the only government bodies with a career mandate to think hard about the awesome eventuality of a nuclear war. With communications and decisions facilities hardened against attack, these might hopefully be able to coordinate the otherwise leaderless executive agencies of the federal government and of state governments as well. Much will depend on whether they can be reached (the crucial role of telegraph and telephone communications as discussed earlier) and on the quality of the advice and plans they can offer. It would, nonetheless, help if their source of coordination could be augmented by some greater political legitimacy; for example, by the presence of duly-elected officials. The chances of this combination emerging rise greatly, of course, where some warning has been generated. Where it has not, the chances go down.

What will be left of the federal government in the event of a large-scale Soviet attack? To put this question differently, how will the fraction of surviving key managerial people in the federal government compare with the parallel fraction in state and local governments, and in private industry?

Most of all such managerial people work in and live near large cities, such that an attack on Washington in addition to major cities will indeed do great damage to the decision-making processes of the federal government. Only by slight contrast, the management of larger corporations has, here and there, been opting to locate in suburban areas outside the cities, mainly to allow its executives to escape the decay of the inner cities, to enjoy golf courses and fall foliage, etc. State governments by past historical experience have often been deliberately located away from the largest city in the state, this being the rule in the U.S. with exceptions only in about one-quarter of the states. Yet state government over time has grown so much as to make many of these state capitals change from small villages to large cities as well.

If Soviet targeting is intended to destroy as much management potential as possible, it can therefore fairly easily adjust for this, hitting Westchester County as well as Washington and New York; hitting Hartford,



Connecticut, and Bismarck, North Dakota, as well. If we are assuming, however, that Soviet warheads are not infinitely available, so that Moscow must choose here and there among alternative targets, it is possible that the slightly more dispersed management of state governments and of private corporations will have a greater chance of surviving, as might the command posts from which they normally work.

What would be the corresponding advantages of the federal government? If warning were to be had of the Soviet attack, the federal government would necessarily have it first, such that a significant part of the government, hopefully including the President and his Cabinet and staff, could get into shelter. By contrast, some state governors might not be able to make their escape.

Segments of the civil defense nexus of the federal government similarly would be somewhat hardened against attack and located away from the centers of cities most prone to be hit. The national military forces will also play an important role, being by their very nature somewhat hardened against enemy attack. The remainder of the federal government that would escape direct attack would be the portions not normally located in big cities, the county-agent system often being cited as a possible fallback for the assertion of a federal presence.<sup>1</sup>

#### 4.2 Legislative Succession

There is a significant risk that many members of the United States Congress and the state legislatures will have been killed in the Soviet attack, as Soviet missiles are targeted on Washington and on many of the

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<sup>1</sup>The county-agents, however, will lack the stature and breadth of experience which we normally would count upon to reinforce whatever legal authority they have. Thought might be given to hardening the communications tying together all such representatives of the federal government around the country, typically housed in the headquarter offices of smaller cities, and to broadening their familiarity with some of the tasks they would have to assume in the recovery situation following a nuclear war.

state capitals, as a fair number of legislators will have been caught in cities that would otherwise be hit.

Current contingency legislation provides for the replacement of senators by appointment of state governors, pending the holding of an election, and for the scheduling of an election in the case of members of the House of Representatives, which makes the reconstituting of the upper house marginally easier than the lower. But a fair number of governors and their designated successors will themselves also have been killed in the Soviet attack.

What the United States government and its people might thus at least consider would be the Constitutional advantages of having backup congressmen (elected in advance, perhaps being designated by the men they would replace) automatically taking over congressional seats in the event of death or incapacitation, similar to what the Constitution provides for the office of the President.

We must certainly acknowledge that a legislature comprised of surviving congressmen plus a host of such replacements would be severely handicapped by lack of expertise and continuity with the pre-attack Congress. Yet a very important part of the political recovery process will hinge on the simple legitimacy of what is being enacted in legislation, as the average American will ask, "Who gave them the right to pass laws?" Whatever the handicaps of such a backup set of legislators (and the handicaps will be enormous in confrontation with the fantastic physical and political problems of the recovery phase), their task will be made a little easier if their electoral mandate is not in question. Such legislators would typically be of the same party and ideological cast of mind as the men they were replacing. They would be expected to reside in their home districts rather than in Washington, and might typically be persons left in charge of the legislators' home offices thus leaving them less in the dark about how the congressmen's business flow had been going.

Where such a recovery legislature would convene after an attack would be problematical, if Soviet missiles had hit Washington. Some kind of underground facility might seem ideal, or perhaps the expedience of taking

votes by wire. No one would claim that the day-to-day business of national recovery could be handled by constant reference to this reconstituted national legislature or to parallel state legislatures. Yet the opposite extreme of simply skipping the separate legislative process entirely is also untenable if we are to achieve as wide an acceptance of political authority as possible after the shock of a nuclear attack, and if we are to re-establish a political and social system something like the one we had at the start.

Whether or not there is a preelected standby legislature all set to go, another problem will arise with regard to the electoral mandate of all the legislators, even those who survive. Someone comes up for election every two years under our system, and even more frequently when one takes into account the states that elect governors and legislators in "off-years," and the cities which have elections in months other than November. What if the Soviet attack were timed to come in October of a presidential-election year, such that even a President who escapes death in an underground bunker will have lost his legal title to the office by the following January?

With regard to state legislatures (which some analyses suggest may be the most likely surviving and effective bodies in any event), provisions might be made to prolong terms of office by declarations of a certain kind of emergency, without thereby compromising the Constitutional requirement for a "Republican form of government." In the case of the national Congress and the Presidency, the task may be much more complicated by the language of the U.S. Constitution and the understandable reluctance of most Americans to tamper with it.<sup>2</sup>

One can hardly expect, therefore, to develop an airtight process of constitutionality about the legislative life of the country following so drastic and traumatic an event as a nuclear attack. Yet what has been

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<sup>2</sup>Holding new elections will be difficult in any event, given the patterns of radioactive fallout and the likely destruction of entire cities, and given the likely shift of major portions of the population, if any advance evacuation proved possible.

claimed here clearly is still correct: that some advance tidying up of the legality and legitimacy of the recovery regime will pay real dividends in getting citizens to accept the orders of authority and in getting them to have some confidence that long-run normalcy can and will be restored. Since such confidence in political normalcy can importantly stimulate the restoration of long-run economic normalcy, these are steps worth considering.

The holding of elections after a nuclear attack will certainly be a very difficult process. While many might thus conclude that it will not be worth the bother, as other needs are more pressing, the impact on the legitimacy of the government and on the public's willingness to follow it should not be overlooked. Any authority will have a great number of difficult and unpopular decisions to make, and the stamp of voter approval counts for quite a bit here.

Again, there are developments in the trends of technology and peacetime attitudes that may help us. We have all along been balancing a desire to make it possible for as many adult Americans as possible to vote, against the need to prevent vote fraud (i.e., to prevent anyone from voting more than once). Extensive and complicated registration requirements were often found necessary for the latter purpose in the past, with proponents of easier systems charging that this was merely an excuse to discourage poorer and less educated people from voting. Defenders of these requirements countercharge that proponents of liberalization were scheming to return to the vicious days of big-city machine politics, where many people were bribed to vote more than once, or where long-dead voters fictitiously cast their ballots for the machine candidate.

The breakthroughs in computer data storage and related communications should soon offer some important ways out of the dilemma here, allowing voters to escape all but a tiny amount of bother with registration (even when they move from residence to residence), while at the same time guarding against voter fraud. It is not easy to predict the pace of these changes, except to guess that the situation will be better by both yardsticks in 1990 than it is in 1980.

As a welcome spinoff for purposes of post-attack political and economic recovery planning, it should at some point then become easier to use relatively secure files of voter registrations to reconstitute electoral constituencies for a post-attack election. The same rules that make it easier for a voter to switch from one county to another within California may allow mixed constituencies of evacuees and long-time residents to elect sheriffs and congressmen after an attack. The possibility even exists that such liberalizations could extend across state lines.<sup>3</sup>

#### 4.3 Alternative Judicial Arrangements

If the electoral mandates of executives and legislators under our normal system are quite limited, we have the connected blessing, for recovery purposes at least, that the judiciary typically is elected for much longer terms. A straightforward prediction for the recovery period is thus that judges and "judge-made law" are likely to play a greatly increased role, if the flavor of political normalcy is to be restored and if widespread adherence to political instructions is to be achieved among the population on the basis of continuing legitimacy.

Judges go through their careers committed only to interpreting the law, but in the process they also create a great deal of law, without which our society could not function well. This may have to be all the more true in the aftermath of a nuclear war.

Purists will be concerned with the fact that the United States Supreme Court may not have survived a nuclear attack, while the same attack may have killed the President and Senate needed to create a new one. Yet what this will mean for the interim will be, simply, that there is no appeal from some lower court rulings, just as there is now, of course, "no appeal" from the Supreme Court. Even today, until the Supreme Court intervenes, we often

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<sup>3</sup>The major addition that would again be needed, from a civil defense point of view, would be to look for advanced hardening and redundancy in the record storage of such voter registrations. There should be no particular concerns about any invasion of privacy here, since one's decision to register to vote has always been, necessarily, a matter of public record.

must entertain seeming inconsistencies from jurisdiction to jurisdiction, inconsistencies which the Supreme Court sometimes deliberately leaves in place by refusing to address the cases appealed to it.

It a roundabout way this brings us back to the question of how much centralization or decentralization will be appropriate and/or necessary in the recovery from a nuclear attack. If decentralization will be necessary, we might count ourselves as blessed for having had a judicial system which, in the Anglo-Saxon tradition, stresses pragmatism and incrementalism and apparent inconsistency, as opposed to the continental systems such as those of France and Germany which have tended to stress consistency and rationality and codification.

How much do things need to be coordinated and made consistent by central authority in general? We obviously need to be concerned about the absence of a U.S. Presidency in the recovery phase, the absence of a Congress, and also the absence of a U.S. Supreme Court. Everyone would concede that the recovery process would go more smoothly if such institutions were available.

Yet we might make our forecast too pessimistic if we exaggerated how essential such centralizing institutions will be. All of our judges are presumably well grounded in the unifying traditions of the English Common Law and the American legal experience. If they each separately do their best to render appropriate rulings based on this tradition (just as they do now), they may not do such a bad job of supplying us with "rule of the road" for a prolonged period of economic recovery. The respect for the courts remains high in our society. Sheriffs and citizens, and soldiers passing through the area, might be expected to take at least part of their cue from the directions of any local court that seemed to be functioning as normal.<sup>4</sup>

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<sup>4</sup>Some thought should, of course, be given to arranging for the replacement of judges who are killed in the attack or whose electoral mandate expires. Other contingent plans might be addressed to the provision of emergency court facilities and the provision of some hardening for the infrastructure needed to make courts work.

As noted earlier in subsection 3.3, one of the more important functions that the courts may have to undertake will come in the area of "equity" law as they attempt to render rulings on the portions of pre-war contracts that are still binding and the portions that have been outmoded by the changed circumstances of the war. Two parties to a contract may each be capable of fulfilling portions of it, and incapable of fulfilling the rest, with the courts intervening to regularize the new version of the relationship. Some additional enabling legislation may be required, if the courts are to take over this function at an optimal level.<sup>5</sup>

#### 4.4 Backup Police Coordination

One of the more difficult issues for any civil defense planner to come to terms with is the role of the military. A large-scale Soviet nuclear attack will surely damage or cripple some of the normal forces of law and order, and will just as certainly put some individuals into a mood to defy authority. At the lower end of the scale, this would simply constitute theft or other crime. At the highest end of the scale, where some state government were to insist upon defying duly-constituted federal authority, it would amount to secession and treason.

Yet we will have to be reluctant to spell out any large number of contingency plans here, for several reasons. First, the U.S. military, by inadvertance or by design, is not well prepared for the assumption of civic police duties at the ordinary level, much less for the administration of an area with full-fledged martial law. Second, even more importantly, the very hint of such contingency planning is sufficient to confirm the suspicions of some opponents of civil defense that such plans are intended

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<sup>5</sup> The English tradition of Common Law in some ways admirably prepares us for this kind of departure from rigid standards, so that the task should not be as difficult as in a more codified and rigid legal tradition such as that of France and Germany. Yet wartime Germany indeed provided us with the example we may seek, as courts were empowered to alter contracts in light of what might seem fair and equitable in the changed context of the war and the Allied bombings.

to erode the traditional American confidence and trust in government by civilians, or to begin to condition us to the sacrifice of this for a more dictatorial government.

As things stand, therefore, the role of the various military units, including the National Guard, will be confused and unprepared, with no clear notion of the degree of martial law that needs to be imposed.

One has to make a bet in one direction or another, and the following might be proposed. Rather than assuming that martial law will ever be necessary in its fuller sense, the emphasis might rather be placed on full-fledged reliance on the normal channels of legal authority -- i.e., governors, mayors, sheriffs, judges -- as the National Guard and the federal Army serve as they do now in natural disasters, entirely at the behest of civilian officials.

The pitch of legal tone would thus be very comparable to what has been applied to urban rioting in the United States, for we have every reason to believe that the degree of public lawlessness and riotousness in the post-attack situation would be lower than in a power failure on a hot and humid evening.

Our general experience from urban riot situations is that policy decisions are best made at the local level by locally elected officials, and are best executed, in descending order, by local police, federal troops (most of whom indeed have been troops with some military police and riot control training), and then, last, the National Guard. A naive expectation might have counted on the National Guard to be better at maintaining law and order in the community from which it is drawn, as opposed to the federal troops who might come from long distances away. Yet the reality is that training for the National Guard has sometimes been substantially less than for regular Army troops, and that such training has been especially important in the sometimes delicate nuances of police duties. The tendency of National Guard units to be composed of men somewhat different in ethnic background or social outlook from recent rioters has also reduced their ability to be a calming backup to the ordinary police.



It is thus not easy to identify what one can prescribe as the national course for preparing these backup police forces, and the country at large, for the role police power will have to play in the case of a nuclear attack. As noted, civil libertarians and others will be wary of drills and practice exercises here lest this be used to condition Americans and their police forces to some new balancing of social powers vs. individual rights. The sheriffs and police chiefs of the country will have to boss people around a great deal more after a Soviet missile attack than they do in ordinary life today. If some Americans suspect their police of looking forward to and relishing greater authority, they will be reluctant to whet the appetites of the police here.<sup>6</sup>

Without very much invoking the prospect of a nuclear war, greater coordination and cooperation could be established among local police forces, the military police of the U.S. armed services, and the National Guard. More regular exchanges of visits, joint participation in training academies, etc., might produce the shared experiences and methodological insights that would pave the way for more effective cooperation when it was needed.

Just as would be the situation, hopefully, in the real post-attack environment, such cooperation could be pitched on the basis of priority for civilian authority -- i.e., having military police officers more often visit civilian police academies -- rather than the reverse. Since this would paint the U.S. military as seeking better techniques from the great array of American municipalities, rather than having the municipalities somehow submitting themselves to direction by the armed services, this might sit much better with those of us who remain concerned about an avoidance of militarism and about the maintenance of civil liberties.

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<sup>6</sup>The experiences of urban and campus rioting have provided some "practice" and so, of course, have various kinds of natural disasters ranging from Gulf of Mexico hurricanes to northern snowstorms. The prevention of looting, the discouragement of people inclined to take the law into their own hands, the maintenance of open highways and central authority, the allocation of scarce materials -- these will be the tasks at hand.

Such a tendency to stress local control and normal civilian authority, in place of very much talk or preplanning for "martial law," of course says very little about the other extreme of insubordination, moving away from local looting and lawlessness, the outright treason of a state governor or urban mayor who refused to release resources requisitioned by the federal government, who refused to admit refugees, or who otherwise sabotaged national purposes.

We have little way of knowing how likely this is. Our Civil War experiences showed several southern governors thus defying Confederate orders from Richmond, but this was after some dire experiences for the South in the Civil War; the precedent of secession from the Union had also, after all, opened up the ability of a governor to defy Richmond as well as Washington. Some similar disobedience and non-cooperation occurred in the North, typically by governors and state administrations themselves somewhat sympathetic to the South and secession. These experiences do not say too much about the future, for either side of the Mason-Dixon Line; in summary, the U.S. Civil War began as a challenge to national unity, while a nuclear war would not begin that way, but would become so only as the result of the deprivations of the nuclear attack.

At the level of state capitals, the country is certainly as united as it ever has been, more than it was in 1861 and more than it was during the War of 1812. While one could address some speculation to the possibilities of ethnic cleavages widening in the aftermath of the Soviet nuclear attack, perhaps, particularly if the Soviet attack were somehow designed to exploit and exacerbate such cleavages, this as yet is hardly tied to insubordinate tendencies in any of our governments.

Having said this much about the basic patriotism of our American state and municipal governments, a worst-case prediction might still see some substantial balking at calls to national duty where one area has been hit harder than another, or where the entire country has been hit hard.

Here we might find a more pressing need to consider proclamations of federal authority, and even of martial law, by the President or his successors in the national government; yet the practical problem will not so much

be the legal modalities of how such edicts are phrased, but whether the central government has the mobile military forces and/or the control over scarce resources to back them up.

One assumes that the U.S. Army within the country will still have some able companies and battalions of troops, and that the Air Force will have some residual troop-carrier capacity, together with some intact airstrips on which they could land. The act of landing troops in a state capital to arrest a governor and/or to confiscate a load of medicine is probably the outer extreme of use of military force that the central government might find necessary.

Much smoother and easier, as will be noted below, would be for the national authorities to have established and maintained a reasonably continuous control over some scarce resources that every governor and major would want ("trade goods," if you will) which would become most easily available to those officials who cooperated with central authority and would be slower in reaching others.

In summary, it is clear that we will need some participation by military policy, and perhaps threat of military force, in the post-war political governance of the country if economic recovery is to be achieved. It is less clear, however, that any extensive reliance on formal martial law or suspensions of normal constitutional processes must be contemplated, since the past experiences of urban rioting and civil war probably exceed the degree of disunion we would encounter after a Soviet attack. Rather than thinking in terms of replacing proper civilian authority, we might instead plan for augmenting it with the technical and manpower help the military services can offer; even in the extreme case of stubborn opposition to national purposes by state and local officials, the most effective avenue for the President may be entirely parallel to what he uses now in the exercise of federal authority: the deployment of resources and incentives which can be withheld as the price of non-cooperation.

#### 4.5 Rationing as a Reinforcement of State Authority

Regardless of exactly how much government intervention we might decide is optimal for the economy, it surely will be conducive to economic recovery, and to the maintenance of political viability in the nation, for the government to be able to take control over supplies of food and fuel and medicine and a few other crucial ingredients in the first aftermath of a nuclear attack. There may be a real shortage in such commodities, or simply a fear of such shortages; such fear would still waste a great deal of time and effort if citizens engaged in unnecessary hoarding. There might, conversely, not be a shortage or even a perceived shortage in some areas, but still a need for political authority to collect some incentives by which to motivate soldiers and citizens to do its bidding, to force people to take risks and to undergo some discomforts where national needs require it.<sup>7</sup>

What would be most clearly needed, under present arrangements, to give the federal government or the state and local governments this degree of control? Different analysts would point to different problems. The few who are pessimistic about the physical impact of the Soviet nuclear attack would of course conclude that the problems were indeed going to be a physical shortage of the scarce commodities, that there will not be enough food or medicine or fuel or housing space to go around. The detailed studies of a nuclear attack, which tend to concentrate on physical damage and on the material inputs to the economy in a recovery process, have often come to more optimistic conclusions -- worrying, however, about whether our political and economic administrative systems will be in order and whether the assets that are available will be properly used for an effective recovery.

If basic scarcity may not be the explanation for a lack of effective state control over such critical commodities, what else could cause concern here? A few Americans might intuitively question whether the legal authority

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<sup>7</sup> See William M. Brown, *On Reorganizing After Nuclear Attack*, P-3764 (Santa Monica, CA: RAND Corporation, January 1968), p. 10.

should be there for the state to seize resources. We have been accustomed to rationing in past war situations, but we have been much more wary of actual confiscation of goods by government authority. If martial law seemed to supply all the precedents of authority that we needed here, many of us, as noted, would be reluctant to turn to this form of law and order for fear of a loss of civil liberties and of much else that the American tradition holds dear.

A good constitutional lawyer could, of course, develop some arguments legally justifying state expropriation of such goods even without martial law. Some additional advance draftsmanship of legal guidelines and constitutional arguments might thus be called for; yet our greatest difficulty here comes probably not with the letter of the law but with public assumptions on the spirit of the law. Most of us, whether we are "left of center" or "right of center," will simply not like seeing scenarios of a nuclear war used to get us more accustomed to the idea of a governmental seizure of property and will thus be distrustful of government in peacetime whenever it attempts to explain and publicize such contingency plans and powers. In short, it will be difficult to get Americans accustomed to the recovery political process here, even if one drafted all the laws needed in advance to legitimize it, because many of us hate what "getting used" to this process would do to the quality of pre-war political life.

If the idea of government rationing rather than actual government expropriation suits us better in terms of American traditions, there is no guarantee, however, that this will suffice for the recovery purposes we are discussing. Governing rationing decrees were bypassed even in the relatively easy situation of World War II by a fair amount of black market activity. Under the much more severe conditions of a nuclear war, could a government which had difficulty in persuading men to leave fallout shelters to undertake projects for the common good be able to police the prevention of such black market transactions? The problem might thus not be a shortage of basic commodities, but a shortage of state authority itself. The state may thus have to assert physical control over food and fuel, not just to assure that these commodities are doled out fairly, but to assure that it itself remains the state.

The physical seizure of economic commodities by state authority is a very serious step, and no one should suggest that it will automatically be appropriate under any and all war situations. For milder forms of economic crisis, or milder forms of war, it might indeed be best for the state to keep its hands off economic processes, lest by bureaucratic meddling it cancel all the efficiency of the market mechanism. Some of the public resistance noted above to "dress rehearsals" and detailed packets of contingency legislation thus stems from a fear that this would only make more likely the premature extension of government ownership and control into more and more areas, thus further upsetting economic performance or political liberty.

Yet, when we are discussing the recovery of the economy from a major Soviet nuclear attack, we must at least consider the risk that all of governmental authority will be in question. The most fervent believer in a market process favors "anarchy plus a constable," but the prospect after a nuclear attack by some predictions may look more like *anarchy*. Government seizure of food or fuel or medicine may thus simply be necessary for regenerating a constable, for restoring the elementary mechanisms which maintain property and enforce contracts, and which assure that a freely negotiated shipment of some material from one city to another would not be intercepted at all the villages in between.

Could a state that was so threatened pull itself out of this quandary, however? Could it muster the physical force necessary to take charge of a food warehouse, if a mob of nearby residents were determined to grab the contents for their own survival? Could it field enough police to force an equitable sharing of medicine or of fallout shelter space? Closely related to this at the end would be the recurring theme of information. How would a mayor or governor or President even be able to know how inventories of food or fuel were distributed, given that knowledge of location might often be the factor deciding possession and use for all concerned?

It is on this information portion of our problem that we might again sound some hopeful notes about the net trends and tendencies in our situation. As the computer storage of information becomes cheaper and cheaper,

and as the total of memory banks available to the American public and the American economy continues its remarkable expansion, it ought to be possible for the federal government and also for state and local governments, or at least civil defense agencies linked to local government, to maintain a reasonably close to real-time and survivable monitoring of the location of food and fuel commodities, perhaps even including those passing through communities on freight trains, etc. A continuous tracking of such commodities, when then compared with an overlay of the nature of the Soviet missile attack, would give the authorities that mattered hard information on what the real extent of shortages was likely to be (if any), and also of the significant facilities to be controlled by state authority as a critical initial input to managing an economic recovery.

The question of how to overpower the mobs may then not be all that difficult to address. If the state can come up with some food as a means of enlisting and paying and holding the loyalty of some sheriff's deputies and soldiers, it can then use these deputies and soldiers to secure control over more, and might at the end come close to winning a monopoly control over such groceries as would still be left to change hands, i.e., at least those that had not yet reached the pantry shelves of individual American households.

Some past studies of civil defense preparations have called for the pre-war stockpiling of food supplies by the United States government. One could hardly deny that the chances of recovery and survival would go up as the redundant reserves of food and other materials in place increased before war's outbreak. Yet, as will be discussed in subsection 5.5, the politically realistic outlook is that the future maintenance of reserves of grain or other food will depend much more on the politics and economics of American farm policy than on anyone's informed predictions on the likelihood of war. In short, we might have more grain and food in place in government warehouses at the start of a war, or we might have less, but such variation will largely depend on West African famines, U.S. harvests, parity policies, etc.

What is proposed here might thus be easier to achieve. Given our general predictions that food production and food processing will be more than adequate in the net for the human needs of survivors, we might concentrate government advance planning not so much on stockpiling additional food in government-owned reserves, but more on acquiring data about the location of all the food that is already out there in the private sector.

Some commodities lend themselves more to centralized control and management while others do so less. Generally, the more we have dispersed stocks of fuel or food or medicine, the better off our people will be, but the less there may be of incentives by which central government can motivate individuals or local governments to serving national needs.

A good counter might come in the supply of electricity, where some severe damage may be suffered overall as the result of the Soviet attack, but where a fair amount of interconnection of transmission lines and sharing of surviving generating capacity may be possible. If the federal government has given advance thought to how such sharing and interconnections might be implemented, we will do better economically after the attack. If federal authority is moreover established at the critical switching points and generating centers, this ought to be usable as a means of bringing recalcitrant governors or local authorities into line. If Vermont is known to have a surplus of some scarce commodity and shows an unwillingness to release it, federal authority could retaliate by cutting off electricity, rather than having to rely on the more extreme step of dispatching federal marshalls or federal troops.

Most commodities in the post-attack environment may thus be available in sufficient net quantity. If we had to point to one commodity for which demand is most likely to jump beyond supply, however, it would most likely be either medicine or fuel. In terms of straightforward material needs, one might thus advocate the stockpiling of both of these in the pre-war situation. In terms of establishing the authority of the state, moreover, we might find at least one of these, *medicine*, surprisingly central.

To focus first on fuel supply, we are all familiar with the difficulties and frustrations of even the effort to prepare for a much milder



contingency, the cutoff of oil from abroad as a result of war or unrest in the Middle East. Some serious effort has been undertaken to find underground storage space for oil, but the technological problems of giving the United States any substantial reserves have not been solved, and we can not be assured that the storage sites will be survivable. Since the Soviet nuclear attack can be expected to target our refining capacity, a very vulnerable and difficult to restore operation, the likelihood is that fuel will in any event remain in short supply after the attack, with most private automobiles becoming useless and surplus. Pipelines for moving the oil around the country will also be damaged in the Soviet attack, driving the country to try to deliver fuel by rail and by trucks over highways.

Whatever the government can do to stockpile fuel will thus be welcome, but the commodity is not compact and survivable enough to be very promising here for advance preparation, or to give the government some new basis for authority, some new basis for its currency. One could imagine the government making advance purchases of oil from sources abroad, even prepaying for shipments, but the extent to which we count on delivery in the atmosphere after a nuclear war is very clouded.

If oil does not therefore lend itself so very much to advance stockpiling as a source of governmental influence and authority, very different conclusions might be reached about medicine. While earlier efforts to stockpile medicine have atrophied to a somewhat scandalous extent, the basic principle is sound. Why should the government not subsidize the advance production of large quantities of the medicines and related supplies which are likely to be needed in the aftermath of a nuclear attack, and then commit itself financially to the continued renewal and maintenance of such supplies? The medicines involved will be less perishable and vulnerable than other commodities, and will surely face an enormously expanded demand in the post-attack situation. Under the control of government agencies they could, moreover, be used as the quid-pro-quo for enlisting services from individuals as these are required. (The historical model is obviously the use the Soviets made of food-ration cards during the siege of Leningrad, which forced soldiers and workers and policemen and ordinary

people to do their duty whether they were of a mind to or not.)<sup>8</sup>

Instead of food rations, which may not be so strapped in the American case we are discussing, the critically rationed item would be medicine, but the impact might be comparable. The leverage might never have to be as crudely direct, or visibly hard-hearted, as paying recovery workers with vouchers entitling them to antibiotics. More broadly, the federal government might simply and more indirectly let it be known that individuals or local communities cooperating in the national effort would "naturally" be given the highest priority with medical assistance, while others would "of course" have to wait their turn, with the result being similarly the increase of cooperation and coordination we need.

Like gold, medicine may thus have the perceived high value to volume relationship we would need to make it become almost a form of money, a form of expediting a shift to trade by currency rather than barter, as everyone respects the ability to deliver of the government issuing such money.

#### 4.6 Backup Radio and Television Communication

It is clear that the United States has long been prepared for the maintenance of backup radio communication after an enemy attack, ever since the inception of the original Conelrad system. Most Americans have all along possessed at least one battery-powered radio, for insurance against power outages in storms or for trips to the beach, etc. The radio in one's automobile provides a second independent receiver in case the batteries in the portable have been allowed to go dead. The net trend here has happily been in a positive direction, as the flood of inexpensive, transistorized, portable radios has reinforced the reception capacity of the average American home. (The transistorization of automobile radios has similarly meant that these could be played much longer, if need be, without draining the auto battery significantly, therefore without forcing a wastage of scarce gasoline in turning over the engine to power the radio.)

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<sup>8</sup>See Leon Goure, *The Siege of Leningrad* (Stanford, CA: Stanford University Press, 1962).

The importance of this should not be understated. When we face the prospect of a nuclear war which might be prolonged into weeks and months, the desire of the surviving American people for "world news" will be quite great. Even as people are huddled in shelters, they will want to know how much longer they are required to stay there, where they should move to when they come out, and what is happening to the rest of the country.

The spread of citizens-band (CB) radios in the past ten years has added a significant new element. More than half of these are located in motor vehicles and thus are operationally independent of central electric supplies. While limited in transmission range, these CB sets will supply some kind of backup for communication where telephone service has been disrupted.

For purposes of disseminating information, and for discussing and developing a national political consensus, we have, however, become increasingly and remarkably dependent in the last twenty years on television. This may then be the source of a major disruption and trauma, since almost all current television receivers are dependent on the ordinary household current which will be unavailable in many places, and since the transmission towers and other transmission facilities for TV stations will themselves be very vulnerable to nuclear attack. It has thus normally been assumed that television will be suspended as a medium of communication in the event of a nuclear war, and that our communication and politics and national coordination will simply have to work by other means.

It is possible that we are underestimating the significance and value of television communication in our resignation to its loss here. As anyone who has ever tried to decipher the outlines of a weather forecast knows, there is much that can be transmitted by picture that cannot nearly as easily be disseminated by words. If our major concern will be the patterns of spread of radioactive fallout, or merely giving American citizens an overall picture of what has happened to the country, any recovery of TV communication would be of great value.

Even more significant perhaps would be the reinforcement and reestablishment of a national legitimacy for a U.S. government and its President.

Under some scenarios, the President will have survived the attack, but will have had to go into hiding to avoid continued Soviet efforts to kill him. Rumors will spread that he has been killed, and that orders coming from central authority are those of an imposter. His ability to be seen, rather than merely heard, may be of substantial value in getting Americans to respond to his signals for a coordinated recovery effort.<sup>9</sup>

One could thus at least consider a national policy of tolerating or encouraging the greater acquisition of battery-powered television sets (with tariff policy on imports from Japan perhaps being a key variable) and encouraging an increase in the number of separate television transmitters (typically on the UHF bands) to expand the chances that there will indeed be a signal to be picked up for many localities after a Soviet attack.<sup>10</sup>

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<sup>9</sup>In other scenarios, the President will indeed have been killed, so that the process will have been launched of establishing a new President. An ability to be seen on a television screen will, again, be of enormous value in generating the necessary acceptance and charisma.

<sup>10</sup>Returning to the area of CB, local police forces and some other government agencies have already made some investment in such equipment, merely to be able to pick up what individual motorists and others are saying to each other. A more extensive and systematic investment in such equipment might be appropriate for post-war recovery, and for expanding the ability of the state to know how its citizens are faring during the immediate post-attack phase.

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## V. APPROPRIATE FORMS OF GOVERNMENT INTERVENTION

Assuming that market processes can be kept alive and that government authority can be kept alive, the appropriate degree of government intervention in the market would obviously have to change in the wake of a nuclear exchange. At points it may be increased; at other points it might be decreased.

The proposals in this section address rationing and price controls, as opposed to the alternatives, suggesting some specific interventions in contingency purchases and sales, in policies on stockpiling and hoarding, and in the application of controls to food supply, foreign trade and transportation systems.

### 5.1 Alternatives to Rationing

With the World War II economic performances of Germany, Britain, and the United States in mind, many analysts might be inclined to expect that comprehensive rationing systems and price and wage controls will be very necessary and appropriate in the post-attack situation. Yet all the destruction and over-taxing of government agencies we have been citing may make such controls very much more difficult to put into place and enforce. Even in the unbombed environment of the United States during World War II, as noted, black market transactions in food and other commodities were difficult to stamp out. In the nuclear war situation, the threat of arrest and fines for such transactions would be considerably less powerful, while the sheer chaos of the situation would be more prone to leave imposed prices considerably out of line with supply and demand, thus increasing the temptations for black market dealings precisely when the penalty was less.

The optimal solution for the government, even when considerations of justice and of need are taken into account, may thus sometimes be to let prices find their own level in the general reconciliation of supply and demand, while trying to make sure that supply is adequate for most sectors and trying to secure control and ownership of some important commodities as part of establishing a "currency" of sorts, to maintain its overall authority.

For some of the reasons noted earlier in subsection 2.3, it is not clear at the outset whether prices will generally soar in the post-attack situation or instead decline. Decreases in supplies of commodities may drive prices up, as would decreases in the confidence individuals have in the government and its paper money. Yet there may also be a major drop in the net money supply, which after some delay would drive prices down rather than up. While it would at all points be desirable for the government to be able to track and stay aware of such price changes, it might be far less appropriate for it to try to set prices, except in a few special cases.

This does not rule out the possibility that government sometimes may be able to, or may have to, intervene against traditional economic practices to achieve a more effective solution. Rather, it suggests that government interventions should be more selective and less comprehensive, more tailored for specific opportunities than an attempt to replace the entire market process with some sort of "war socialism" or "disaster socialism" command economy.

For example, the United States (like for that matter Germany, Japan and Britain, the societies from which we draw much of our practical experience on bombing and civil defense preparations) has not had any societal tradition of mass-feeding. Yet the experiences of World War II show how — whatever the sacrifice of family privacy — enormous savings and economies were possible when large groups of people were fed together, in the stringent aftermath of enemy air raids.<sup>1</sup>

If nuclear weapons were not characterized by the aftereffect of radioactive fallout, it could indeed be predicted that one of the speediest responses to air attack would be the establishment of cafeterias and soup kitchens and large-scale dining operations around the edge of our cities, where survivors could be nourished, where the competence and authority of state agencies could be demonstrated. The likelihood, however, is that the

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<sup>1</sup>See Fred C. Ikle, *The Social Impact of Bomb Destruction* (Norman, OK: Oklahoma University Press, 1958).

post-attack environment will require some substantial waiting period in which survivors shelter themselves as best they can against radioactive fallout. Whatever optimism we might be able to muster about the attainability of such protection, most of it will stem from the possibility of improving separate shelter spaces for families or small groups of people, and hence will not be consistent with any economies of scale in food distribution and food preparation. It is only in the somewhat later stages, therefore, where fallout has been sufficiently attenuated that this form of government assertion over economic life would have a chance to come to fore.

### 5.2 Contingency Government Purchases

Time may be of the essence once any sort of nuclear "all clear" can be sounded, once it becomes reasonably certain that Soviet nuclear attacks on the United States have been halted, so that fallout levels are no longer being renewed and reinforced. If we are then to be immersed in a race between the depletion of stockpiles of crucial commodities and the restoration of essential production, it might be criminal folly to have facilities capable of producing essential supplies sitting idle for lack of instructions and assurance of payment.

An old proposal still may sit short of implementation; namely, that the U.S. government issue a large number of standing contingency contracts guaranteeing that the producer will be paid, contracts which would already be present in the files of the relevant firms, to be activated and brought into binding effect by a declaration of the federal government.<sup>2</sup> A manufacturer of medicine or fuel or shoes would thus know immediately that he was to produce at full capacity when the threat to his labor force had receded, not having to wait for new instructions from Washington, or new orders from customers to guide him on this. Overtime employment, instead of unemployment, would begin immediately, backed by the contingency letter-of-credit which

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<sup>2</sup>See, for example, David F. Cavers, "Legal Planning Against the Risk of Atomic War," *Columbia Law Review*, Vol. 55, No. 2 (February 1955).



had been left with such manufacturers in advance, backed hopefully also by the bolstering of the banking and monetary systems we discuss elsewhere.

The difference of several weeks' or a month's production in some sectors might be crucial to the pace and the extent of the overall recovery; even if some goods were at the same time produced in redundant or useless quantities, this would be a price well worth absorbing as part of getting up to national needs in other categories. Careful design of the contingency contracts in the first place might eliminate much of such waste. Periodic revision of the contracts might seem desirable here as well, except that the tendency of such revisions is to confuse recipients and to reduce their confidence that the documents in question will have any real power. The ideal would thus perhaps be to issue sets of contracts that could be left in place for long periods of time, contracts with the U.S. government backed by the financial powers of that government which would specify extensive production of critical items after a clearly defined message has been issued.

In addition to having such standing orders in place, by which manufacturers could confidently go ahead to produce goods that will be needed, knowing that the government was guaranteeing a market, the United States might also have in place a few standing prohibitions, by which certain kinds of goods superfluously using up scarce resources were automatically banned from production upon a general signal from federal authorities.

The combination of such standing orders and automatic prohibitions would hardly cover the entire array of economic choices normally handled by our efficient market mechanism. Government orders and government decrees can never really replace the effectiveness of consumer demands and production costs as they are reconciled in a competitive arrangement. Yet such government directives would at least give a running start to the resumption of economic activity after an attack, since market mechanisms could not be expected to work in the first days and weeks after the enemy assault.

Where the government has intervened to prevent production of certain goods using scarce resources, it might then in a few cases have gone further on an advance-arrangement basis to commandeer the input resources, so that the government would be known thereafter as a source of such resources for

priority producers needing them. This would entail an entry into the market going well beyond existing stockpiling policies. One still wants to limit the extent to which the government itself becomes a buyer and seller here, with the expectation that it would get out of the business fairly rapidly, as soon as more skilled private entrepreneurs showed themselves able to take over.<sup>3</sup>

It is very debatable how much the government should want to intervene in the economy beyond this with systems of price controls and rationing. Some of each may be necessary, at least for the short run, to prevent the most outrageous misallocations of scarce goods in the atmosphere of temporary shortage and to prevent the kinds of windfall profits that most Americans would find unreasonable. Yet too heavy a dependence on rationing and on price controls typically is counterproductive, eliminating the incentives that move people to produce and to conserve, and eliminating the guidelines to what the correct prices for commodities should be.

At the very minimum, some substantive advance preparation of ration coupons will be in order, covering at least those commodities where the government, looking ahead, sees the situations of scarcity most likely to arise. Since the printing of such coupons after an attack may be difficult or impossible, and at least would use up some precious time, the distribution of preprinted coupons, held in secure and guarded vaults until they are needed, would seem an appropriate step.

Contingency planning is always hazardous, but some forms of planning ahead indeed turn out to be quite helpful in the chaos of the actual emergency situation. While a fair amount of analysis has already been done on the likelihood of industrial bottlenecks in our interdependent economy, it

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<sup>3</sup>As a source of information on where such scarce resources might be available, the data banks of the federal government might, however, persist as a crucial and valuable resource well into the recovery period. As noted earlier, one would hope that the federal government, with an investment in data storage capacity, could begin to develop such a peacetime oversight capacity in the near future as part of being continually prepared for the possibility of a nuclear attack.

might be appropriate for government agencies themselves to do as thorough a study as possible of where the most severe bottlenecks would arise, and what the most direct and effective form of substitution in each case would be. Information on such fallbacks and substitutions might then be delivered in advance intense briefings to the executives of the firms requiring such substitutions, with a view to shortening substantially the period of uncertainty and confusion on what inputs they are to turn to.

At the extreme, under government prodding, the producer and user of such alternative products would be asked to negotiate contingency contracts for such supply, quite analogous to the advance contracts that the government itself will have entered into with suppliers of critical materials; the intent again would be to reduce the kinds of uncertainties that normally would waste precious time, and to have the relevant officials of supplier and user become well known to each other, in the same way that they now know their normal contract partners.

When considering how we might use as much as two weeks' warning of a war with the U.S.S.R., primary attention is normally directed to evacuating the labor force and all the rest of our population to safer locations, and perhaps to reinforcing industrial facilities against blast somewhat by the placement of sandbags, etc. As an important supplement or alternative for the use of this hypothetical two-week period, one might want to consider the crash production and safe stockpiling of certain commodities which otherwise would be in critically short supply after a Soviet attack, perhaps the kinds of commodities that cannot be produced and stockpiled well in advance because of a short shelf-life, or because of the high monetary value tied up in them, but commodities which would nonetheless contribute importantly to the survival of our people and our economy after the attack.

Are there factories which, in the interests of all concerned, should therefore be kept running at full blast for the two weeks concerned, rather than being sandbagged with the work force evacuated to distant locales? What can a preprogramming of the needs of a post-attack recovery situation tell us about such priorities, and about the particular industries which might fit this picture?

Whether or not we will want to be mobilizing economic production for conventional military purposes in the aftermath of a nuclear war depends heavily on our assumptions about contingencies. One could imagine a situation where the U.S. economy had been badly damaged, but that of the Soviet Union had been devastated such that Soviet ability to project tank columns into Western Europe or China or the Middle East had basically shriveled. Under such circumstances, it would seem folly to assign any high priority to additional American tank production, when far greater urgency would go to restoring transportation and electric power and medicine production within our country again. Under other circumstances, however, it might be of high national priority to get some additional military forces deployed abroad, to counter a continued Soviet menace on the battlefield, such that scarce surviving port or airfield space would have to be assigned to outbound shipments of troops and equipment, even ahead of inbound shipments of relief supplies for the people and economy of the United States.<sup>4</sup>

### 5.3 Encouraging Stockpiling While Discouraging Hoarding

In the time we have left to prepare for the prospect of a major nuclear war, we can hardly be concerned only with shelter construction or population evacuation possibilities. Quite important to economic recovery may be government decisions on the stockpiling of potentially scarce commodities, and government policy working to encourage (or discourage) the private stockpiling (hoarding) of such commodities. (We properly would call it *stockpiling* when it contributes to the general public good, and *hoarding* only when it

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<sup>4</sup>Our proposals for standing orders for production after an attack, to be backed by the guarantee of government purchase of the goods in question, might thus have to be modified and complicated by preparations for a "contingency A" and "contingency B," as the priority would go either to military goods or to basic capital and civilian consumption goods. Too much of such contingency variation would, however, obviate the purpose of the standing orders in the first place (i.e., to replace uncertainty with a resolute signal of what is expected); we thus might well want to hold the alternatives to two or three at the most, to be sure that a government signal is indeed trusted by the firms that matter, as a prod to getting them to produce as rapidly as possible.

comes at a time, or in a form, which hurts the public good by stampeding people into an "every man for himself" situation.)

Most goods have a finite shelf-life time, but some do not, and some at least have a very long period before they lose their utility. The direct approach of encouraging people to stock a fallout shelter has been tried in the past, and has had an uneven success in part because people saw the government as crying "Wolf," in part for the old and familiar reason that many Americans always repress any thoughts of a nuclear war and thus avoid any responses to the useful advice offered for such a contingency. We must thus examine some other government policy choices, not directly coupled to reminders to Americans of the possibility of nuclear war, which nonetheless might lead American firms and consumers to accumulate and stockpile larger quantities of the goods that would help us through the post-attack recovery phase.

The range of choices that make a difference here would need to be more extensively surveyed by specialists in business administration or consumer economics. Laws on taxes clearly must have some impact. So do laws on the labeling and packaging of food. Subsidies could be offered to food manufacturers to develop groceries in less perishable containers. The mere threat of inflation, undesirable as it is, has sometimes in the past driven consumers in some countries to build up larger stockpiles of foodstuffs in their homes ("hoarding" as it has normally been described).

One does not want to get the government into the business of spreading false rumors about the future unavailability of key products. Yet the general atmosphere of the beginning of the 1980s, amid recurrent shortages of automobile fuel, is that the American consumer no longer takes for granted the availability of whatever consumer goods he will desire.

Even as a means of counteracting inflation, American consumers might be encouraged to stock up on foodstuffs and other goods in larger quantities when they are in season, which would be wise simply from the standpoint of civilian life, but again would have the war-contingency beneficial effect

of deploying larger reserves of commodities close to those who will need them.<sup>5</sup>

We might even consider a re-examination of our restrictions on pharmaceuticals as part of perhaps getting the average American's medicine cabinet more abundantly stocked. Our current tendency, based on good medical practice for a non-war situation, is to discourage overstocking of such cabinets, urging people to throw redundant medicine away lest it be used to the wrong person, lest Americans begin to do a great deal of self-medication. Yet American drug control rules are considerably stricter than those of most other countries. If we take the war possibility seriously, we might thus wish to consult with medical authorities on whether we might not relax a few of our aversions to self-medication, letting more medicines be issued with "directions for use" printed neatly on the box.

Ideally, the government will want to have potential control over resources after an attack, so that the most pressing needs can indeed be met, so that manifest injustices can be avoided and that its authority can be reinforced. Yet it also will want the country to have greater quantities of resources after such an attack, for additional quantities typically can make the rationing and allocation task easier. The kind of stockpiling by private individuals which enhances the total stocks of the United States, and enhances or holds equal the stocks available to the government authorities rather than drawing them down, might thus be viewed as generally desirable. The kinds of last-minute panic buying (hoarding) that do not increase the total available in the U.S., but merely shift a scarce resource from public control into private hiding places, would by contrast be undesirable. Policies ought to be developed to achieve the first while avoiding the second.

In review, we normally have been inclined to discourage individual citizens from hoarding food in our past wars or crises, on the natural

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<sup>5</sup>One hesitates to have great amounts of perishable foods in the freezers of Americans at a point where electric power will become a prime target of a Soviet attack. But many kinds of food and medicine are less perishable and less dependent on refrigeration and electric power.

conclusion that this was selfish and antisocial behavior that would upset rational planning for the welfare of all Americans, or at the least because it created an artificial shortage and drove up prices.

With the emergence of the threat of a nuclear attack, however, our civil defense advice to individual Americans was that fallout shelters should be arranged, and that such shelters should be stocked with food and other necessities for survival through the necessary shelter time. In effect, this was thus a new government endorsement of what some might have seen as "hoarding," but the kind that would be done gradually enough to avoid artificial shortages and disruption of normal pricing.

While such advice has typically been ignored, in the normal atmosphere where thoughts of a nuclear war are avoided, we might fear that such advice would be very much followed, even to excess, if a crisis emerged which made nuclear attacks seem more likely. We might have preferred that homeowners instead stock their basements in an orderly process well in advance of any crisis, so that the grocery shelves could be restocked and replenished again, so that there would be no gaps now in the "pipeline," and so that no shortages and food riots would erupt before the Soviet attack had even come.

Hoarding is thus bad when it comes all at once, producing a temporary inflation of prices and a temporary shortage which distorts real societal priorities. It is also bad when it leads to wastage, as commodities lose their effectiveness and value on the shelf. It is, finally, bad when it ties up funds and capital unproductively on the shelf, or when it leads to diversions of resources from poor to rich which no social rationing scheme would have countenanced.

Private stockpiling, as opposed to hoarding, may however be good when it gives us a greater cushion against the disruptions of a nuclear attack, when it does not occur all at once, and when it is concentrated in less perishable commodities.

The proposal here is thus that we must look beyond what the government itself can do in stockpiling, asking ourselves instead how government action generally might encourage ordinary private citizens and private firms to do more of the right kind of stockpiling of their own.

#### 5.4 Exploiting Slack: Some Historical Analogies

Some economic performances in wartime have been quite impressive in the past, those of both Germany and the United States during World War II drawing a great deal of praise. Despite the heavy Allied bombings of that war, German war production actually rose from 1942, 1943 and 1944. The U.S. output of war materials, conversely, staggered the predictions of both British allies and Axis enemies, and directly produced the Allied victory.

Yet the accomplishments of Albert Speer in Germany, and of American war-production management, have to be set into a context which might possibly be relevant to the nuclear war situation we are considering here. Each was achieved with an economy that was saddled with a fair amount of slack capacity at the war's outset. In the American case this was because the country had still not really pulled out of the Great Depression, with the economy actually backsliding in 1937 and 1938. In the German case it was, rather, because the Nazi regime had tolerated the continued production of what would have to be classified as luxury goods, even after the war's outbreak in 1939, because Hitler, after the experience of World War I, feared what would happen to German morale if any comparable austerity seemed in store.<sup>6</sup> The German case also was beset with a great variety of non-standardized idiosyncracies of competitive production for market. Speer's very remarkable accomplishment in expanding war production in the face of bombings by the U.S. and British air forces thus came as the result of putting an end to the production of the non-essential consumer goods and of forcing German industries to standardize procedures to exploit some major economies of scale.

What does this say for the chances of a successful post-attack recovery in the United States? The studies which focus mainly on crucial economic inputs have already made the same basic point, that the aggregate capacities in most sectors are probably more than sufficient to meet the demand of

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<sup>6</sup>See Burton H. Klein, *Germany's Economic Preparations for War* (Cambridge: Harvard University Press, 1959).



survivors, even if the number of survivors is large rather than small. Since we are assuming that the Soviet attack would come early in any war, rather than after years and years of conventional campaigns of economic attrition, we could assume that the fraction of American output that was "luxury" rather than essential to survival and to life would be large.

The amount of slack, moreover, will be greater as our economy tends to run at less than full steam. Regrettably, in terms of peacetime considerations, a reasonable prediction for the next two decades is that we will be burdened with more unemployment than we would like and more underutilized industrial capacity than we would like. As the silver lining on a cloud, however, this should make the chances of a recovery from an attack greater. First, it will give us more redundant industrial capacity from the start. Second, agencies of the government will have been more continuously drawn in on decisions about the uses of manpower and capital and about the placing of "make-work" orders in the process of combatting unemployment and industrial wastage, all of which will slightly more accustom businessmen to respond smoothly to government direction and appeals.<sup>7</sup>

The American economy in its current state thus in several ways resembles the slack German economy at the outset of the war, with a great many of the goods produced clearly having to be styled "luxury" by any war-time standards, with competing products being produced in a way which offers the consumer a higher standard of living by offering him a choice, but which thereby loses some of the "maximum" of production which would ensue if such choice itself were found to be a "luxury."

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<sup>7</sup> This then amounts to suggesting that business and labor would not have responded to government direction on war production as well between 1941 and 1945 if there had never been a Great Depression, if prosperity had continued all through the 1930s from the good years of the 1920s. By the same logic, one could almost welcome a minor economic crisis before the attack, such as a cutoff of Arab or Iranian oil, as part of getting the American economic public of producers and consumers attuned to the problems of shortages and frustration, and attuned also to accepting rationing and direction by government authority. A large cost of such a "preparatory exercise" would, of course, be that we would have lower advance reserves and stocks of oil, or whatever other resource was in short supply, hardly a price we particularly want to pay.

It would of course be misleadingly optimistic to draw too much hope from Albert Speer's World War II experience, since the Allied air attack was much weaker and slower than what a nuclear war would produce. Yet the key to Speer's success was nonetheless instructive, for it was based heavily on "rationalizing" what previously had been a competitive economy, forcing what had been separate firms manufacturing competing goods to standardize on a single output, with each firm doing what it was best at and with all parts being made sufficiently interchangeable so that economies of scale could be exploited.

Advance U.S. government planning could thus look not only to possible bottlenecks, but also to the zones of such slack; for example, deciding which truck manufacturer should produce trucks at full blast and which should not produce any at all, rather than having both companies (if they both survived) producing trucks at normal pace. To the extent that the government lets out contingency production contracts, some steering potential will emerge here. If there will also have to be directives shutting down some forms of luxury goods production, these may include some of the rationalizing decisions that Speer's regime illustrated.

A crucial (and pessimistic) consideration is, of course, that most or all of this might have to be determined in advance for the case of a nuclear war, unlike World War II where the Germans had the option of making a very leisurely set of decisions about how to adjust to the Allied air offensive. As with the evacuation of populations, the possibility of two weeks of warning is of very great help here; but such warning is never guaranteed, and even two weeks would be a very short time to make such major economic decisions. The decisions will also themselves have to be highly contingent on the pattern of the Soviet attack, on which cities and factories are destroyed or doused with radioactive fallout, and which escape destruction.

As a more optimistic factor, to which we have already referred many times, we of course have the new computational facilities which make more possible the detailed calculations of inputs and outputs, and of cost-effectivenesses and economies of scale, calculations which would have been beyond the capability of the most astute planners in the German case.

Detailed computer modeling of how the economy should respond, of which firms should produce which output under what conditions, may thus be desirable for the recovery we are pondering, going beyond some of the current computations which are straightforwardly directed at estimating the damage of the attack.

### 5.5 Agricultural Policy and Food Supply

Agriculture is a portion of the American economy which has seen a great deal of government intervention premised entirely on normal peacetime conditions. We would thus hardly be advocating any great enlargement of state interference in this sector by suggesting some ways in which such agricultural policy might be modified to take the possible needs of a post-war recovery into account.

While the exact impact of a nuclear attack on food production and food processing is debatable, there is little disagreement that adequacy of food supply will be one of the most crucial inputs to a successful economic and political recovery from such an attack. Our general policies to date on the maintenance of larger or smaller food reserves have hardly come in response to the likelihood of threats of war, but rather have reflected domestic farm income policies and international demands on stockpiled food surpluses. If a war were ever to happen, it clearly would be desirable that American food storage facilities be filled to overflowing at that moment, even when some of this food would be destroyed by the enemy attack. One therefore ought to consider a pattern of policies which will not leave this to chance, or to the vagaries of international need and domestic farm politics, but which rather perhaps channels and harnesses international need and domestic policy to deliver another "dual purpose" contribution to national recovery potential.

Farmers will most probably not object to changes in government policies which encourage them to produce crops, rather than holding back production by placing land in a "soil bank." For purposes of being prepared for recurrent risks of overseas famine (risks which hardly seem likely to abate in the face of continued population growth), a policy of stimulating agricultural production might similarly be desirable. The continued prospect of

major grain purchases by foreign countries (including the Soviet Union) adds to a background which would make all of this look quite natural and sensible.

The cost of pushing food production upward is that it might, of course, generate an addition to inflation, as more marginal productive facilities have to be brought into play. Some of this could be abated, as in the past, by the intervention of government subsidies, the same subsidies which were condemned at an earlier time as distorting the market and producing wasteful "gluts" of farm produce. Such gluts may now be needed from year to year to keep South Asians or West Africans from starving, or might be a vehicle of foreign policy in dealing with the U.S.S.R. They surely would be welcome if a war were ever to come; and the knowledge of the existence of such food surpluses, especially if they were given some protection against fallout, might therefore again strengthen American resolve at the bargaining table during any crisis, which is one of the most important goals of any civil defense effort.

The suggestion therefore would be that national policy on agricultural production again be steered toward encouraging agricultural output, perhaps even with subsidies allowing farmers higher incomes while holding down domestic food prices.

The mixture of explanations for this change of policy would include, but would not preeminently stress, the contribution to national recovery in the event of a nuclear war.

#### 5.6 Foreign Trade

Our trade with foreign countries has also had a history of government intervention and interference, not only because we impose tariffs but also because other governments interfere with this form of economic process, sometimes even being tempted to seize American assets without compensation.

An important amount of material help for any post-war economic recovery of the United States may indeed have to come from foreign countries, countries which hopefully have escaped most or all of the destruction inflicted on the United States. We do not know whether Canada and Mexico will

be in this category, or Australia, Brazil, Japan, etc. We also do not really know what incentives would induce any such undamaged industrialized areas to share their resources with us.

Advance purchase of, and payment for, some of the goods we need might seem a step in the proper direction, but foreign governments in the past have been known to confiscate and hold back such goods, especially when an international crisis suggested a major change in the assumptions behind the contract. What we probably thus need to study as part of our planning for recovery is the actual likelihood that any particular prearrangement or political or economic approach could assure that the goods we want will actually be delivered when we need them. Are some foreign countries inherently much more likely to honor a contract, no matter what? Would having the goods in the physical possession of firms owned and staffed by American nationals make much difference for the likelihood that the good would not be held back? Are there ways in which we can broach the uncertainties we feel to the relevant foreign parties in advance, so that they, in reassuring us, realize the importance of the commitment they are making and thus psychologically commit themselves to it?<sup>8</sup>

Given the urgency and stringency of the likely post-attack situation, it is not unthinkable that we might enter into a policy of deploying the U.S. Navy to take control over any and all merchant shipping within reach in the Atlantic or Pacific Oceans, regardless of previous destination and legal title to the cargo, holding such shipping at a reasonable distance offshore until the nuclear salvos and fallout have diminished (presumably thus farther offshore in the Atlantic than in the Pacific), inventorying the aggregate of what we have thus confiscated as it relates to the needs of American survivors.

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<sup>8</sup>One does not want to think very much about the extreme possibility of threatening military action against any undamaged economies which refuse to let out the "commodity futures" we may have already contracted for and paid for, the goods we need. But how can one develop incentives in a more finely tuned and humane way to produce the necessary results?

A world which has largely escaped nuclear destruction, while the United States and the U.S.S.R. have suffered badly, might be expected to understand the need for this. In any event, the total of what might be possessed here, for use in the U.S., or for barter and release against the dispatch of other supplies from foreign sources, might make a considerable difference in the pace of American recovery. Once again, a valuable accessory would be a central data bank and programming model for the inventorying and planning of such a windfall.

By its very nature as a nation, the United States would not plan to base any great part of its recovery upon such outright confiscation of foreign property. While a nuclear war clearly would be as traumatic a shock as this "nature of the nation" has ever suffered, we would still want to conduct our dealings mainly on the basis of fair contract, offering real reimbursement for whatever we have taken for our own use. Yet the early stages of the recovery process may indeed be critical, such that the "forced loan" of assets belonging to others would be necessary, even where the lenders were inclined to object.

Given the more stringent assumptions about the damage to the American economy after a nuclear attack, one might indeed predict that American investments overseas would amount to a relatively expendable (and, over time, indefensible) asset. We might thus be prepared to liquidate and sell such titles fairly early, in exchange for relief supplies relevant to the situation within the United States itself. We would thus offer the foreign states involved a clearly legal and legitimate title to resources which they might seize sooner or later in any event; we would be getting something in exchange for these assets while we could still do so, when we needed the something-in-exchange the most.

In the end, one must be somewhat cold-blooded and realistic about all of this. Whatever the United States has arranged with foreign countries before a war outbreak for the future delivery of relief supplies, much of such delivery in the actual event would hard-headedly depend on what the United States and Canada could then deliver in exchange. The two North American countries indeed are hardly a matter of indifference to the outside

world. The rest of the globe has developed a dependency on their exports of grain and foodstuffs, if nothing else; more than two-thirds of all the grain shipped in international commerce comes from these two countries.

Our elementary problem after a nuclear attack would consist of feeding our survivors and getting essential economic processes under way again. Yet, very soon after this, some tradeoffs would emerge again on whether such recovery could best be accomplished on the model of self-sufficiency, or instead, could be achieved more rapidly by trade with willing countries abroad. Despite all the scarcities of the post-attack environment, there might yet be some commodities which we would be better off swapping to foreign states rather than holding for ourselves, thereby to extract some foreign source commodities which we need even more.

Given the uncertainty of American monetary relations with the outside world, it would seem altogether likely that such exchanges would have to be negotiated on a barter or swap basis. An advance inventorying of the likely commodities to be involved here, and likely or plausible rates of exchange, might thus be entirely in order, even going so far as to make guesses now on the foreign economies that are most likely to escape Soviet nuclear attacks.

Just as the points of change-in-railway-gauge may be critically disruptable targets in the U.S.S.R. (along with Soviet ports), the harbor facilities of the United States may be crucial bottlenecks for the import and the export of supplies after a nuclear attack. In our scenarios we typically assume that such harbors will be hit, if only because they might be viewed as important military targets by the enemy, critical to the continued operation of our missile submarines or to the maintenance of conventional ground and naval operations abroad.

Some considerable investment might thus be in order in the coupling of "across-the-beach" unloading equipment with normal merchant marine shipping (most of which shipping might well survive the war). This might be done largely with tools already in U.S. hands, mainly requiring a systematic mating of the amphibious techniques of the U.S. armed services and the commercial techniques of the merchant fleets of the U.S. and friendly nations.

While we have gone some distance in preparations for the mobilization of American-flag shipping for a prolonged conventional war, the emphasis now would rather be on contingency planning for the recovery of the continental United States after a major nuclear exchange.

### 5.7 Transportation

Transportation is an already heavily regulated and government-guided industry within the United States because parts of it (e.g., the railroads) amount to natural monopolies as other parts (airlines and trucks) are heavily dependent on the physical infrastructure the government provides. Studies of the post-attack environment suggest that alternative modes of transportation will be very differently affected by a nuclear attack, some parts being severely damaged and others having an appreciable recovery capability.

Pipelines for oil and natural gas are apparently quite vulnerable and have next to no redundancy, but may not be so difficult to repair if advance planning is devoted to this area. Transmission lines for electric power are somewhat more redundant, with capacities for alternative switching and sharings of loads. Railroads, in part because they were overbuilt in the heyday of speculative construction, are also somewhat redundant (although the tendency over time is perhaps going too far toward losing this excess capacity, in the wake of abandonments and consolidations). Truck transportation using public highways will have a good degree of flexibility and redundancy. The interstate highway system, once known officially as the National Defense Highway System, may indeed amount to the best example of how to design a peacetime-use system with a view to post-nuclear attack recovery; the same ring roads that help traffic go around cities, rather than through them, may make a great deal of difference if a war ever occurs.<sup>9</sup>

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<sup>9</sup> A deficiency of road transportation by truck is of course that it is directly dependent on the supply of diesel fuel or gasoline, both of which probably would be in very short supply. Yet any form of transportation will require some energy input, such that the energy-supply losses of a nuclear attack may amount to one of its most serious aspects.



The possibility has been suggested that a few parts of the country will be deficient in the net in means of transportation after a nuclear attack, much of California perhaps being cut off if several dams on the Colorado River are destroyed, some other portions of the West being similarly isolated since the network of roads and railroads is thin. Railroad and highway bridges will always be more difficult to repair than ordinary right-of-way. For the rest of the country, however, the network of roads is quite dense, generating a great number of paths for moving people or supplies, and the elementary information structure of road maps and driver experience is in place.

It is perhaps in the area of railroad linkages that we might especially be doing too little to take post-attack recovery into account. The consolidation and shrinkage of railway networks is proceeding relatively willy-nilly in the processes of bankruptcies and economic savings, with no apparent attention being paid to keeping in being the railroad lines that could be used to route traffic around cities at some distance. While one hardly in this day and age envisages the construction of any new rail lines to circle urban areas at the same distance as the interstate highway system, greater attention might be paid to lines already built which might be kept in usable condition by the application of a marginal subsidy.

It is also very possible that large stretches of the railroad system will be intact except for the exposure to nuclear fallout, as such rail transportation could afford a much greater capacity for the movement of large-bulk quantities of key commodities after an attack than could trucks or aircraft. Serious thought might be given to the advance fitting of some locomotive units (coupled to tank cars carrying long-range fuel supplies) with protection against radioactive fallout -- if necessary, rebuilding them with substantial lead shields -- so as to offer the authorities an elementary capability for exploratory testings of the rail system, or the dispatch of very high priority cargoes.

Clearly one of the most important transportation factors in recovery would be getting skilled workers back and forth between where they live and where they work, where either or both of such locations may have been changed

as a result of the enemy attack, where automobile repair parts may be scarce, and where gasoline may be very scarce.

The American public by and large does not enter such an environment psychologically well prepared for the adjustments needed. The fact that almost every adult American is accustomed to a private automobile and used to finding his own way is an asset for the rapid evacuations and relocations we might envisage before an attack (as compared with the Soviets who are by habit dependent on mass public transportation), but it would be a handicap in the recovery period where car-pooling or public transportation would become imperative.

Given the typical American's attachment to privacy in his vehicle, his addiction to the flexibility that lets him escape close coordination and scheduling with other riders, the necessary adjustments here are not easy to sort out. The methods that have been tried in our peacetime environment, simply to reduce excessive energy use, air pollution and traffic jams, have not been very successful, and a number of such methods might have even less chance of working in the sheer chaos of the post-attack situation.

The company bulletin board has been one method used. Another has been simply encouraging people to call each other on the telephone, allowing individuals to negotiate their own car-poolings on the basis of personality compatibility as well as schedule compatibility. Recourse to computers, in an attempt to optimize the packaging of car-pool groups on the basis of locations and work schedules, has at times looked more promising in the peacetime context, and might be the method ultimately turned to in the recovery phase.

Where spare-part shortages or gasoline shortages do not drive workers to such poolings, they may simply have to be made mandatory in the recovery phase, with the state or the firm directing people into groups rather than waiting for the groups to sort themselves out. Personality compatibility may have to be given the same low priority it receives now within the workplace itself, as the commuting trip becomes a part of the work regime rather than part of the worker's enjoyment of privacy.

Where minibuses and vans are available which are cost-effective in fuel, these may be given priority over any use of private automobiles whatsoever. Government agencies may indeed at times have to confiscate or expropriate automobiles in the interests of keeping a pool running, via cannibalizing of spare parts, etc. Where autos have been abandoned, this would be an easy enough process. Where fuel shortages put individuals into the mood to sell off their extra automobiles (at least the ubiquitous second automobile), for whatever the market will offer in meaningful cash or valuable goods, the state may be able to avail itself of a stock of such vehicles without any heavy recourse to the brute force of confiscations.

It may not be so easy to generalize about the net impact on survival and recovery prospects of any tendency toward mass transport systems in American cities. Subway lines, with appropriate modifications, where they are cut deeply enough, can sometimes do service as blast shelters and also as fallout shelters. In the Soviet case, they would probably do yeoman service for the evacuation of Moscow, but most New Yorkers might be tempted to rely more on automobiles than rapid transit to make their escape.

Many American cities are finding that buses are more efficient than subway rail systems as mass transportation systems. The recovery advantage of an investment in buses would of course be that their routes can be changed drastically when needed, allowing for greater and more distant evacuations, allowing such buses to be used later at a distant location when work patterns are resumed and a new commuting system is required. Buses would have the disadvantage, however, of being dependent on gasoline or diesel fuel, which may be in more constricted supply than the electricity which drives rail subways.

All of this is to conclude that there is no perfect mass transit system for civil defense purposes. Yet the tendency toward a net increase in such transit is nonetheless desirable here from one bizarre perspective: most American families will still elect to maintain at least one automobile, even if bus lines or subway lines are established, so that the growth of such systems will offer us some important redundancy as well as diversification

as a by-product of the evolution of peacetime commuting patterns, which again can be of great value in the recovery phase.<sup>10</sup>

In an environment checkered with nuclear fallout, the means of transportation that might seem most able to ignore this obstruction would be aviation. Given some likely upsetting of air traffic control and navigation systems, and the likely shortage of aviation fuel, the national government may well want to assume total control over this mode of movement, with highest priority going to the movement of management people and key specialists. Given the filing of flight plans already required for air safety purposes, this is a sector where it ought not to be so difficult to equip the government with a real-time computer record of where these planes are at the war's outbreak, and of what the range and carrying capacity of the surviving aircraft would be. Where a critical shortage in one corner of the country can be relieved with supplies brought in from another corner, and where the resurrection of national political authority is deemed important, air transportation under the control of these authorities can prove itself very valuable indeed.

The government should thus be able to assume as much control as it needs over transportation, by the assumption of control over fuel and by the maintenance of barriers at key junction points. The ability to stop trucks or trains or airplanes from moving will in turn be a key input to the ability to get them moved to where they are needed. Some of the management

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<sup>10</sup> Apart from any public investment in buses for mass transit systems, the net of post-attack disruption of transportation could also be reduced in the next decade if our private driver were to be moved away from the gasoline engine. The development of the battery-powered electric car would be enormously desirable already in the peacetime context of reducing the pollution caused by auto emissions and of reducing our vulnerability to ordinary cutoffs of oil from abroad; this would similarly be a vehicle which lent itself more readily to use in our post-nuclear attack situation, on the working assumption that the supply of some electricity will be easier to restore, post-attack, than the supply of gasoline.

techniques required here will simply be extensions of what we already see applied by state authority in snowstorms and hurricanes.<sup>11</sup>

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<sup>11</sup>As noted elsewhere, communications also will have a very high priority for the resurrection of the economy. Given the general disruption of economic processes, one could recommend that the postal service suspend charging for mail delivery during an emergency period, given that stamps may not be available or money may not be accorded much value, while the urgency of getting messages through will have increased. For those desiring any kind of high priority or "special delivery" service, a ration of special-handling stamps might be doled out on the basis of so many per customer, with some businesses perhaps getting an extra quota on the basis of the urgency of the product they deliver. In a large number of functional areas, e.g., bridge tolls, rapid transit systems, etc., dispensing with the collection of user charges might similarly become appropriate, avoiding the labor involved in policing the payment of such charges and allowing for fuller use of the service in question.

## VI. TAKING CARE OF THE AMERICAN PEOPLE

The output pursued in all planning for recovery from a Soviet nuclear attack becomes the welfare of the American people. People, as skilled labor, moreover amount to one of the most important inputs for recovery.

The proposals in this section address various trends and possibilities for facilitating the greater survival and more productive employment of the American people, also indirectly thereby reinforcing public authority, as the government which can provide services to its people thereby renews its mandate.

### 6.1 Protection of the Labor Force

Most studies of inputs to the American economy suggest that population is eminently worth protecting, not only from the humane point of view, for this is what the American way of life is all about, but also from the narrower and more material perspective of what would most speed the economic recovery of the country. While a few other inputs may be in short supply and thus urgently in need of increased survivability (especially medical services and transportation), the projected impact of a Soviet attack on the mixture of capital and labor suggests that labor after a time will be more in short supply than capital.

Part of this assumption is based on the simple patterns of collocation of industry and population within the United States, whereby an attack on a steel mill is bound to kill a great many workers and other people. Some of it is moreover based on the premise that the Soviets will not somehow carefully orchestrate their attack to hold down the casualties in the population. Also contributing, of course, is our lack of extensive evacuation and shelter arrangements.<sup>1</sup>

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<sup>1</sup>Labor might thus be in surplus in the immediate post-attack environment, with wage rates perhaps falling. But our ability to rehabilitate

If the Soviets had a super-fine way of surgically determining who would be killed and who would not be killed in their nuclear attack, they could of course utilize this to achieve a crippling of the American economic balance which was optimal for their purposes, keeping alive all the retired persons, college professors, musicians and professional athletes, for instance, who would be unlikely to be able to contribute very directly to recovery from the disaster (but whose needs nonetheless would impose substantial demands on the economy as it struggled to recover), while killing all the engineers, plumbers, electricians, steelworkers and physicians.

Given the lack of such fine-tuned discretion, is there nothing that the Soviet attack can impose except the normally predicted pattern of extensive fatalities in a shotgun attack of general missile strikes on the industrial base? Unfortunately, we at least will have to contemplate the possibility that the Soviet attack could be fine-tuned to some degree in the direction specified, perhaps drawing down on our valuable human capital a little less in the process of leaving our human needs considerably greater; perhaps leaving us even with a net surplus of human capital. One should remember that the proudest goal of U.S. "precision bombing" in World War II (a goal which we did not even come close to accomplishing) would have been to destroy physical capital in Germany and Japan without hurting human capital and without necessarily killing any human beings, skilled or unskilled.

The fact remains, whether the intent of the Soviet attack is to kill Americans or to keep them alive as burdens on our economic and political position after the war, that we will want to keep them alive. It is doubtful that the United States government will ever want to get into the game which is apparently played extensively by Soviet civil defense, allocating shelter space priority to the important human capital segments of the population, the human labor force critical to power-war economic output, while

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<sup>1</sup>(Continued) capital is much greater than our ability to replace labor over any short period of time, such that labor may indeed be the highest priority input to be shielded for longer-term economic recovery.

assigning markedly lower priority to the population which is not part of this centrally important labor force.

Our practical bind here may in the end spare us any moral dilemma. The only way to assure adequate numbers of engineers for the post-war world will be to seek evacuation and shelter schemes that would protect musicians and retired persons along with the engineers. The Soviet attack may be intended to kill people in all of these categories, or it may be shaped in a necessarily imperfectly-tuned attack aimed most specifically at the engineers. Under either circumstance, we will have reasons to try to shield whomever we can.

Assuming that there is any warning at all of a nuclear attack, it is generally agreed that the most useful approach to saving lives within the United States would come with the evacuation of people from large urban areas and from places located close to strategic force installations, dispersing them to areas where their primary shelter need will concern radioactive fallout rather than blast or heat.

It would generally follow that anything that can be done to make governmental processes more tuned to such advance population movements will expedite post-attack recovery. Some of such preparatory steps will apply to integrating displaced persons as early as possible in the political processes of elections and consultation, so that they can make their normal inputs into the formulation of policy. Other steps would be more relevant, of course, to assuring continuity and efficiency of output.

In other portions of this report we discuss procedures which might make registration for voting and the establishment of residence easier; the long-term trend in the United States is for this to become smoother and more automated, to avoid needlessly denying the more mobile Americans their voice in the political process. It might be altogether reasonable for federal and state and local governments now to make educated guesses about the likely flows of population in the event of nuclear attack. We have more clues on this than we might realize. A great number of Americans will already have identified their "alternative home," without even thinking about it in these terms, by owning a vacation home far from the city in which



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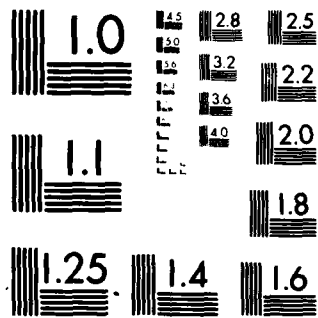
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they live or by maintaining a close relationship with a particular relative or family friend. It probably would not be an unbearable intrusion into the privacy of Americans to pose census questions, or to conduct ordinary opinion polling on a more random basis, on the likely locations of these alternatives homes.

The question could be phrased as simply as: "In the event of a disaster making this city uninhabitable for a period of time, where would you go to find an alternative home?" A great deal of any evacuation in the United States during a future international political crisis is going to be carried out by individual American families using their automobiles, following ordinary road maps (and with no guidance beyond this) as to routing or destination.<sup>2</sup>

Clearly of highest priority to many or most Americans will be ascertaining the whereabouts and well-being of relatives and friends, and the breakthroughs we have seen in data storage and collection should be harnesable to giving the central government an enormously valuable service to offer here. One of the most important services the German government was able to provide during the bombings of World War II came precisely in this form.<sup>3</sup>

We are today accustomed to being able to call or visit any office of an airline around the United States to have them consult a video display of the reservations we have made for flights, with an instantaneous ability to feed back changes in such reservations. It should be physically and financially feasible to erect a similar system for the entire country, operated by the U.S. government. It might specify nothing more than the name and

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<sup>2</sup>One could extract a great deal of similar information simply by computer comparisons and analyses of data in the public domain; for example, forwarding addresses left with U.S. post offices each summer, listings in telephone books, etc.

<sup>3</sup>See Fred C. Ikle, *The Social Impact of Bomb Destruction* (Norman, OK: Oklahoma University Press, 1958).

Social Security number, current location and health of any citizen who has submitted such information, with the information being recallable for anyone who asks for it, with the information having been submitted voluntarily by those of us who would want our whereabouts and state of health to be known.

The worker who knows that his or her spouse is alive and safe will be much more willing to turn to working for community purposes. Even the worker whose family is definitely dead may be more quickly mobilizable than the one left in a perpetual state of uncertainty.

Whatever else the government surviving a nuclear attack can offer in the future, the one commodity that will be of very high value and which should be easier and easier to offer is information. Government will want to offer information because this is helpful to the personal and national recovery efforts of the citizens and their economy, and because it will be a stock in trade where government's authority is being questioned, where individuals were wondering why they should pay attention to or give any service to the national government.

#### 6.2 Some Trends for Fallout or Blast Protection

An obvious paradox of the political and social issues of fallout protection is that these issues become easier rather than more difficult as we approach close to total coverage for the population. To have the only well-equipped fallout shelter in town is not only to invite the snickers and social criticism of one's neighbors for being "different" and "odd," but also to raise a real and elementary moral question for the nuclear attack contingency we all fear: "Would you shut the door of the shelter to keep everyone else from crowding in?" If the majority of citizens of a community were to equip themselves with such shelters, the social feeling of being an "oddball" would disappear, and so would the moral issue of who was going to deny scarce shelter space to whom.

The same phenomenon of course applies to communities which are well equipped, surrounded by other communities which have not taken similar steps. It is one thing to accept a share of people who must be evacuated

to escape the blast impact of warheads aimed at densely populated cities. It is quite another, however, for a village in Vermont or central California to fight off hordes of people from other villages nearby which neglected to invest in fallout protection.

We have been through the domestic political battles before on whether we should try to make the necessary quantum jump here; can we construct and equip the prebuilt fallout shelters for enough of a fraction of total coverage to avoid such issues of social conformity and social responsibility? We ideally want people to have shelters and not to feel odd or guilty about having them.

For the moment the alternative seems to have been adopted of relying on widespread availability of advice about converting ordinary basements (on short notice after the onset of conflict) into adequate fallout shelters. Such dissemination of understandable advice, and of ancillary equipment such as radiation detectors, medical supplies or foodstuffs, may not suffice for the response cited. In part, this will be because of the public's reluctance to face unpleasant reality. In larger part, it may be because of the continued feeling that such preparations would put one ahead of one's neighbors (and thus into a position of ridicule by neighbors, or perhaps a contingent position of having to bolt the door against one's neighbors).

This entire exercise has been one of looking for "blessings in disguise," for trends in the rest of life which might somehow be harnessed to helping us survive a nuclear war. The increased public awareness of the possibility of accidents and radiation from peaceful nuclear power plants may play such a role, as one might hope that it could induce the population at large to examine their environment again for the most direct way of escaping and avoiding radiation, without feeling that such behavior is out of step when rumors emerge of nuclear terrorism, as fanatics try to sabotage a nuclear power plant, or as such fanatics are rumored to have somehow come into possession of a crude nuclear explosive device.<sup>4</sup>

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<sup>4</sup>If nuclear war is "unthinkable," our problem is as always one of getting people to come close to thinking about it, by some indirect routes. Investing in high-quality preparations against nuclear fallout may remain

Ecologists may thus do civil defense a service in sounding the alarm about nuclear power plants. Again, without having intended to, they might have done a similar service on another front. It is generally understood that the construction of a home, or a factory, or a school below ground would cut the costs of heating and cooling the facility and thus (in a future likely to be plagued with energy shortages) might provide a very ecologically sound mode of operation. While humans might react to the loss of windows as somehow turning them into "moles," modern interior decoration methods can do a great deal to relieve this. The all-glass skyscraper of the 1960s is clearly no longer the ideal public building.

A below-ground structure, properly designed, of course also offers a great deal in protection against nuclear fallout and blast, where the enemy warhead has not impacted directly. As we watch hopefully for trends in the physical environment which might expand the list of "dual purpose" arrangements, arrangements simultaneously improving our peacetime outputs and augmenting our ability to recover after an enemy attack, the techniques of partial or total underground construction might open a hopeful lead here. The public, as mentioned before, does not want to hear excessive reminders of the possibility of a nuclear war. Yet, if preparations for such a war contingency can be packaged as a response to the increase in energy costs, the public may be much more receptive.

A general governmental policy of subsidy or tax concessions for underground construction might thus be formulated, including also the construction of such new federal buildings as post offices, etc. Their utility as fallout shelters should be mentioned, but not saliently stressed, while the design should clearly be such as to make the fallout and blast protection appear as part of the structure. Such aesthetic aspects as the retention of the previous contours of the landscape can of course also be included as part of the package.

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<sup>4</sup>(Continued) unlikely for each American until it comes to seem more likely for most Americans, after which it may become much easier to achieve for the remainder of Americans.

### 6.3 Fuller Employment of Labor

Unlike the U.S.S.R., the United States will never allocate priority for shelter access to people simply on the basis of their likely contribution to economic recovery. Such a hard-hearted priority system would be very likely to turn Americans entirely against an evacuation or shelter arrangements.

The general findings of studies of economic recovery potential, as noted, are that most forms of labor will indeed be entirely necessary and useful for the post-attack phase, as labor rather than physical capital may generally be the scarce resource.<sup>5</sup> Rather than discriminating among human beings, the emphasis will thus have to be on a fuller mobilization of labor, e.g., in the early and efficient sorting of retired persons, wives, teenagers, and practitioners of lower priority occupations into tasks where they will be of some help.

At the outer extreme, one might try to encourage Americans to visualize in advance what their primary job role in such a recovery would be, but the general aversion to speculating about and predicting the nature of a nuclear war may stand in the way of this. Short of this, some of such speculation and calculation might again be attempted through simulation models and computer data access, to try to predict the likely routing of labor reserves when they need to be mobilized. Typical questions will simply be "how many trained nurses are there in this community, how many typists, how many people capable of driving a truck?" Depending on whether the data showed a surplus or a shortage of the specified skills, decisions could be more reasonably made on which activities are to be resumed in which areas.

The immediate aftermath of an attack will of course see a fair amount of "unemployment" among able-bodied survivors, but this will hardly indicate that the aggregate of labor somehow will have become redundant. A great

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<sup>5</sup>See Howard M. Berger, *A Critical Review of Studies of Survival and Recovery After a Large-Scale Nuclear Attack* (Washington, D.C.: Defense Nuclear Agency, 1978), p. 3.

number of people will have had their previous workplaces destroyed or put out of working order by the nuclear attacks, and the disruption of needs will have made some other firms and industries become redundant for the recovery effort. Yet the likelihood is that almost every able-bodied man or woman will have some skills that would be urgently useful for the national recovery effort, for we hardly will have any overall economic problems of surplus production or shortage of aggregate demand; the "unemployment" we are noting here will be heavily the result of imperfections in market information, as it takes time to match up skills with needs for skills.

As stressed many times in this report, the great hope of a good recovery performance may thus again come with better and fuller usage of the enormous expansions we have seen in capacity and speed of data processing. It really ought to be possible to program computers with likely locations of needs, and then locations of able-bodied people, then to render out advice on alternative jobs in a way which minimizes the geographical dislocation and the delay until work is resumed. It may be a truism to note that the more we know about what we are doing in the recovery phase, the better the recovery will go. Yet, against all the gloom which would be appropriate with the growth of hostile destructive capabilities, we can still draw some hope in that we will be equipped to "know" much more in the future than we were in the past.

Clearly one of the more plausible ways of expanding output in a post-attack situation is by running undamaged factories and physical capital on a three-shift, 24-hour basis, mating up the surviving labor which escaped harm when their factories were destroyed with undamaged factories needing such labor for the extra shifts. Advance data collection and advance planning on the relevant skills and specialties and machine-familiarities involved would again expedite the movement of the necessary labor that the acceleration of output required here. At the least, some systematic overview of comparable facilities across the country will be in order, looking for the natural pairings that would allow such matchups to be achieved more rapidly, then also taking into account the necessary consequences in terms of such inputs as housing, transportation and food supply.



As the economic recovery process rolls ahead, one of the most important liberating inputs for the mobilization of labor supply may come in the area of child care. While the restoration of school operations might normally be seen as being of low priority, it actually becomes much more critical when one wishes to liberate male and female parents from child-minding concerns, and one could indeed imagine trying to run schools on a year-round basis for the length of the recovery period. Such operations would of course also be important for the longer run, in that we would not want to lose the future human capital that would be wasted by any prolonged disruption of educational systems.

Apart from school-aged children, early preparations would have to be made for pre-school children, and there will obviously be an enormous problem with orphans and with children separated from parents whose whereabouts or survival are unknown. The humane rule of "every child will be taken care of" has been adopted in analogous situations in the past in the bombings of World War II, and even though the disruption of a nuclear attack will be much more severe and traumatic, this goal should be aimed for in this case as well. An advance knowledge that such will be the operational arrangement for this nuclear attack contingency will again be of great value, if it can be somehow delivered so as to reach all the Americans who matter, for the elimination of such basic concern about the likely welfare of one's family would surely free up some useful services and energies for the national recovery effort.

When we think of military participation in economic recovery, we usually turn our thoughts all too quickly to military management and direction of businesses, with all of the predictable inefficiencies and loss of market entrepreneurial style that we are accustomed to in such cases. Yet there is a very different type of military participation that perhaps should be rehearsed here. Given the likely form of a Soviet nuclear attack, a great number of specialists in military units scattered around the United States will survive only if they are evacuated from target points, and they may then indeed have no effective military unit to return to. Most of such people will have skills they are using in the service, or other skills,

which would be of value to the general economic recovery process after an attack. Because they are in active military service in the pre-attack environment, they, unlike other Americans, are conditioned to be receptive to contingency orders.

As things stand, most of such people may already have standing orders to evacuate bases and find shelter, and then to wait for further instructions. Some serious thought might be directed to formulating in advance the "further instructions," directing them as to which firms or communities they should contact to offer their services, etc. Under such emergency conditions, one could imagine such people working on loan to private firms while still drawing their military salary, with the government at some later date sending the firms involved a bill for their services.

If anyone at all should be given shelter priority in the American system, it should be the specialists who are able to keep other people alive, i.e., medical personnel. In the location of fallout shelters, and the preparation of evacuation plans, most Americans would thus probably agree with giving particular attention to this necessary form of human capital upon which so much will depend in the war's aftermath, a form of labor which indeed can be reliably predicted to be scarce. We surely as a nation want to accord special protection to our missile forces and the rest of our military forces, upon which heavily depends the hope of avoiding a war in the first place; and to our central government and local governments, upon which post-war law and order and civilization most likely depend. Beyond this, the priority that would be easiest to support would go to medical categories.

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## VII. FINAL SUMMARY

This report assumes that the economic potential and industrial infrastructure of the United States following a nuclear war will be sufficient for recovery, but that such potential may not be adequately exploited because of failings in our political structures and administrative arrangements.

The report presents a set of positive suggestions for improvement. The suggestions are designed to be adjustments rather than revolutionary changes, adjustments which will not impose any major economic or social or political costs on our peacetime society. (The working premise is that any changes which imposed such major costs would not be likely to win acceptance.)

One optimistic assumption is that we can find a number of opportunities for useful adjustments in the rapid pace of technological change in America, as innovations which are improvements for our peacetime way of life can be channeled and shaped while they are being installed to increase our prospects for a post-war economic recovery as well. The report, in effect, thus advocates a substantial expansion of the logic and psychology of "dual purpose" civil preparedness. While this has been defined more narrowly up to now, as forms of explicit civil preparedness arrangements which will also be helpful in cases of natural disaster, we suggest generally broadening this to watch for all the rearrangements which simultaneously might be helpful for the wartime situation and for the peacetime.

The political problem may be twofold, as we consider the basic needs for recovery. Government must be made more useful for recovery if economic potential is not to be wasted. Above all, however, we will want to be sure that government will be government, i.e., that after a nuclear attack we will not instead simply have anarchy, or a group of competing factions and regional units. Economic recovery will be very difficult if we do not maintain national unity and a modicum of law and order.

These two considerations clearly go together. Government will be more useful as it is able to assert and maintain its authority. And it will win

more respect for its authority, where this has been challenged, as it is able to offer additional useful services for the recovery.

Just as in the peacetime case, government can also try to do too much. We thus have to watch for cases where the individual businessman should be left alone, where free-market methods may expedite recovery more than command-economy methods.

Yet, just as in the peacetime case, government will have to do something, at the least preventing chaos about who has the use of what property; and a very important part of the problem is seeing to it that some sort of governmental authority persists.

Among the specific possibilities for advance adjustments which would significantly increase the speed of our economic recovery, the following are particularly related to keeping the normal market exchange processes of our economy functioning:

- upgrading telephone and other wire communications systems to make normal person-to-person communication easier after an attack (subsection 2.1);
- establishing more survivable and redundant banking systems to allow the transmission of funds and the certification of credit in the post-attack recovery environment (subsection 2.2);
- preparing alternative monetary arrangements, including a possible return to the gold standard to avoid the development of a wasteful barter economy after such a war (subsection 2.3); and
- arranging possible alternative securities and futures markets to go into operation after the recovery process has begun, to allow for the efficiencies such central markets facilitate in lieu of less effective government decisions on prices (subsection 2.4).

Among the possibilities more particularly related to sustaining the strength and authority of our government in the post-attack period are the following:

- some decentralization of the executive, so that Washington, D.C. would be less indispensable to executive coordination and action if that city had been destroyed (subsection 4.1);
- enacting further legislative and possibly even Constitutional amendments to provide for a more rapid and orderly succession process in state legislatures and in the U.S. Congress after a nuclear attack (subsection 4.2);
- preparation of the minimum facilities required for normal functioning of the judiciary after an attack, on the premise that "judge-made law" will be of enhanced value in this environment (subsection 4.3);
- backup preparations for the coordination and mobilization of police agencies after an attack, with a view to keeping this fully compatible with American standards of private rights and civil liberties (subsection 4.4);
- advance preparation of contingency rationing schemes designed to take real needs and scarcity into account but also intended to become, as quickly as possible, a monetary system by which coupons could be bargained and exchanged to reflect real user preferences and needs, exploiting such rationing systems, above all, to reinforce central legal authority, to give the government a backup for its currency, with an inducement to keep soldiers and civil servants and others at their jobs (subsection 4.5); and
- expanding the backups of radio and possibly television communication, to restore the parts of our current political consensus-building process which have become dependent on such media (subsection 4.6).

In addition, the following possibilities are particularly relevant to sorting out the proper degree of government intervention in the economy for the recovery period:

- considering alternatives to rationing and price controls, so that these devices can be used selectively and kept to a minimum (subsection 5.1);
- developing advance contingency contracts negotiated between government and private firms; and among private firms, specifying immediate shifts of production in the event of an enemy attack (subsection 5.2);
- developing government policies to encourage individuals and families and firms to do more stockpiling, while avoiding last-minute panic buying, i.e., hoarding (subsection 5.3);
- exploiting such unwanted, but possibly unavoidable, trends in our economy as stagflation and commodity shortages, with a view toward making the United States more institutionally and psychologically prepared for a war situation if it comes (subsection 5.4);
- establishing an agricultural policy of expanding food reserves (subsection 5.5);
- devising a set of policy choices on foreign trade after a Soviet nuclear attack, on the premise that some crucial inputs to our recovery may only be available from abroad (subsection 5.6); and
- establishing preparations for maintaining central control over transportation systems, to reconstitute the United States as a single economic unit rather than letting it become a number of autonomous, autarchical economies (subsection 5.7).

Finally, the following possibilities most directly affect the people of the United States who serve as a crucial input to recovery as labor and whose safety and welfare are the ultimate output:

- preparations for the better shielding of the labor force and for the collection of better data on the whereabouts of individual human beings after an attack, on the premise that information will be one of the most important goods the state can offer in this environment (subsection 6.1);

- some possibly beneficial trends in attitudes, and material options, on fallout shelter protection, and even underground construction which provides blast and fallout protection (subsection 6.2); and
- possibilities of applying expanding data-processing capacities to sort out alternative employment possibilities more fully in the post-attack environment (subsection 6.3).



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Work Unit No. 4341-E.

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